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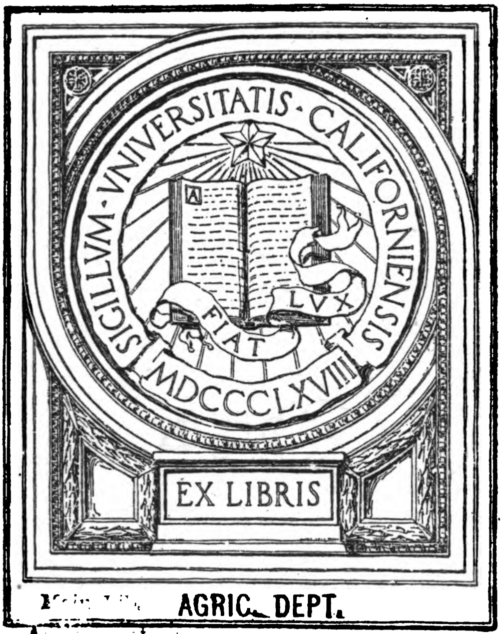
FORESTRY REPORT.

KANSAS STATE HORTICULTURAL SOCIETY.

1885.



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SIXTH ANNUAL REPORT

ON

KANSAS FORESTRY,

BY THE

KANSAS STATE HORTICULTURAL SOCIETY,

FOR 1885.

EDITED BY THE SECRETARY.

> "Forest culture has forced itself upon the attention of thinking men, both in Europe and America, as one of the great practical questions of the age. It is not only a subject of interest to the tiller of the soil, but it demands the consideration of the statesman and the physical geographer. But the thought which rises highest, and is really the directing and leading consideration, is, the modifying influence which sylvaculture is to have upon the climate at large, and hence, the influence which it is to exert upon the ultimate condition of soil, and upon the standard of civilization which is to be found in our vast prairie region in coming ages. The great questions of material, social and moral prosperity are here involved. Are we to rise to the demands of the age and of the Nation, or shall we fall short of it? Do we realize that through the earnest prosecution of this culture for this vast region, it may be made the home of millions of happy and prosperous people, or by a neglect, only the transient home of a few thousand cattle-herders—an almost dreary waste forever?"
>
> —PRESIDENT E. GALE.

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1886.

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UNIV. OF CALIFORNIA

KANSAS FORESTRY.

THE USE AND ABUSE OF OUR FORESTS.

BY JAMES H. CANFIELD, STATE UNIVERSITY.

I have been asked by your indefatigable Secretary to present this evening, in a very simple way, the practical value of our forests aside from that estimated in dollars and cents; with some illustrations in defense of the general theory of forestry. In so doing, I must neçessarily go over much ground that is somewhat familiar to us all, and indeed can scarcely be expected to say anything either startling or wholly new. You will remember the task once set an Englishman, a Frenchman, and a German to describe an elephant, neither of them having ever seen or heard of one. The Englishman called for his servant, and made all arrangements for a hunting tour in the East, that he might *see* one; the Frenchman went to the great libraries of Paris—center of the world to him—to learn what had been *written* on the subject; while the German lighted a huge pipe, closed his eyes, and began to *evolve* an elephant out of his own inner consciousness! Now I cannot evolve forestry out of my own inner consciousness; I have very little knowledge of forestry literature outside of statistics; and hence I have been obliged to hunt down my elephant through a rather tangled jungle of facts gathered largely from observation, and indirectly from historical and other reading, with quite a different purpose in view at the time. He who walks through the world with his eyes open, and who reads history in a many-sided way, listening intently for every word of advice and of warning that may fall from the lips of the past, cannot be ignorant of what the forest has done for man, nor of what man has done and failed to do for the forest. He may know, as I know, very little about delicate tests of temperature and moisture; of the careful experiments that have been made in reboisment—such as successfully reclaiming one hundred and forty thousand acres of sand-dunes in Holland; or the million and a half of acres in the landes of France, once only pestilential swamps, but now covered with maritime pine; or the quarter of a million of acres of dunes in southwestern France, once gleaming sand, but now a huge forest. He may not understand, as I do not, electrical phenomena, and their modification by woodland. But he *does* know that in all history the plainsmen have sooner or later been subject to the mountaineers; that those who stripped the East of its timber fell into ignominious oblivion; and that out of the German forests came the Teutonic children—for they were nothing but children—who shattered the empire and legions of Rome, and made the civilization of to-day both a possibility and a most marvelous fact!

If what I wish to say this evening were to be in the form of a stately discourse needing a text, I should speak from the words of Humboldt: "Men in all lands and climates seem determined to bring upon future generations two calamities at once—a want of fuel and a scarcity of water." Or I should select a paragraph from Champollion, who in writing of the great Sahara said: "The hand of man produced this desert and every other desert on the face of this earth." Or I would use a beautiful figure which I once heard: "Earth was an Eden once—our sins against the world of plants have brought on

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us all our misery; the burning sun of the desert is the flaming sword between us and Paradise." Even believing with myself that these are extreme statements, you cannot doubt the general character of this paper; nor the position which I occupy in respect to this great question, so fraught with interest to us all, so terrible in the penalties which are threatened either ignorance or indolence. Yet observe, if you please, that it is still spoken of as a question. It is still debatable; — though the weight of observation, experience and sound judgment is rapidly coming to the side of direct, united, practical and aggressive action. Yet we must admit that the exact relations of forest and climate are not yet known. We are very far from having entirely satisfactory statistics on which to build either theory or practice. Much hasty generalizing from insufficient data has made many skeptics. There are not wanting very honest men and very able men who think that the entire forestry movement is uncalled for, a great waste of time and energy, even if not a movement which is in the hands of a few individuals, and, in the language of the unregenerate West, "is being worked for all it is worth." There are many others who think that it may be well enough to agitate the question and call attention to a few glaring faults, but who do not believe there is any immediate danger, or who fancy that the problem will solve itself somehow in some way if only let alone. And there are a few who simply make a point-blank denial of everything, insist that there are more acres shaded with foliage to-day than there were fifty years ago—"and they know it,"—which is far better than statistics! — or that "there's enough anyhow, and always will be, so what's the use?" In a country where the majority rule, and where every man's vote counts one — no more and no less, the more's the pity, either way, sometimes! —the work that lies before us is to convert the few and to quicken into new life the many.

Nothing is gained by withholding the frank admission that deforestation is often both necessary and desirable. Bosky bowers and shaded dells, and nature's wooded aisles and fretted vaults, and bridle-paths, and all that go with these, are admirably adapted to the wants of the gentleman of reddish complexion, whose royal robes consist of one Mexican spur and a paper collar, and whose queen's court wardrobe comprises only a stripe of blue paint and a nose ring! But it goes without saying that civilized man lives in the sunlight, and cultivates the ground; and that the latter needs air and sunshine as well as shade. Our ancestors would have given us a poor start in life had they been content with even slight inroads upon nature. The wilderness without was the scene of as sharp a battle as was the wilderness of sin within; and woe to us had they failed to make extensive conquests in either direction.

Aside from the necessities of cultivation and pasturage, much of this clearing was directly beneficial in its results upon health. The first-comers on this continent found huge tracts of timber within whose confines a ray of sunlight was scarcely known. The deposits of ages were mouldering in the wilderness, huge swamps and sedges were far more frequent than now, and fevers and other malarious diseases swept over colony after colony with terrible devastation. When the axe had let in air and sunshine much of this disappeared, and all conditions were so changed that man no longer regarded the forest as an enemy but as a friend. Not infrequently similar or other conditions exist to-day which make it desirable that timber should be taken, root and branch, from the soil — and man is in every respect better for the taking.

So, too, with regard to timber and its relations to rainfall. We may as well admit at the outset that there are certain tracts, and large tracts, of land that would doubtless have all desirable moisture, even were there neither tree nor shrub on its surface. Such, for example, is Florida — its long, narrow peninsula jutting out into the mild waters of the gulf, with prevailing winds laden with moisture ever ready to sweep across every rood of its soil. In this category, too, would come the British Isles, which, with but four per cent. of their surface in woodland, have never known drouth. Something of this would doubtless be true of Italy, should it lose even half of its present twenty-two per cent. of timber. Oregon and Washington Territory, with the damp winds from the Pacific, would probably continue fertile if complete deforestation should take place.

Further, it is yet to be proved that trees under any circumstances actually *increase* the amount of the moisture deposited. If I am rightly informed, it is no longer questionable that more rain falls in the Kansas of 1885, than fell on that "Great American Desert" which we used to see in the geographies of the last generation. But this must be at least as much due to land-culture as to timber-culture. I find that it has been claimed, and not yet disproved, that certain experiments with the rain-gauge, in certain countries, have shown even more water falling on cleared than on timbered land. How it falls, and how it is retained and utilized; these are other and very different questions. Our general data in this entire discussion are yet so meager, that even a single exception should excite our attention, and call for yet more careful investigation.

Again, health statistics do not fully bear out the usual assertions with regard to deforestation. I wish to freely confess that I fancied once that I had made a discovery on this point. I was prepared to make some statistical statements that would startle the world, to say nothing about making my everlasting reputation. I would publish some tables, based on the United States census reports, that would show that weakness and illness and timber-destruction ran side by side; that prairie States were given over to the seven devils of disease, while within the lines of forest influence disease and death shrank away like the mythical beasts in a patent-medicine advertisement, or a poor debtor on the first of the month. So I worked at odd hours for fully three months, only to find the exceptions growing more numerous every day, till at last they far outvoted the rule; the people of the comparatively treeless States refusing to die off, with a cold-blooded selfishness quite at variance with all I had expected of them. I never published that monograph; but I have a bundle of waste paper for sale to the highest bidder, positively without reserve.

It seems best to make these admissions at the very outset, as we can then determine all the more readily whether what may be hereafter adduced will outweigh these doubts and uncertainties, and give us, in the face of them, firm ground on which to stand in demanding immediate and vigorous action; for such unquestionably is the demand. The good things in this world never come on the let-alone principle. He is a lazy lourdan who leaves things to themselves, who thinks that drifting is as good as driving, who is unwilling to meet the constant demand for thoughtful, united and unselfish action. Every man should be a gospeller—a bearer of good tidings—in this world; knowing a feast to be prepared, he should go out and even compel others to come in.

What, then, is the theory of the relations of the forest to moisture? What is the practical value of timber, aside from the market value in actual use?

There are certain general conditions of all soils in relation to moisture. First, there is the impervious soil, off which water runs about as readily as though it were the best canvas or rubber cloth. Such are our heavy clays, and very much of our Western prairie until it is broken—though in this case the water is turned by the closely-woven sod-fibers, rather than by any quality of the soil itself. Then there is the pervious soil with impervious subsoil—sandy loam, with underlying clay. In this case the water is at once taken up by the soil, but is held by the subsoil, forming pocket sloughs, "wet spots," as our farmers call them; swales, and even the larger swamp or morass. Again, we have soils that are pervious throughout, with almost no power of retaining moisture—so little, in fact, that every time it sprinkles here the Chinese have to put on rubbers! This washes down off a hillside almost as readily as the water itself. It is perfectly evident that neither of these soils of themselves can be considered desirable factors in the well-being of any country. In the case of the first, we have moisture unequally distributed; falling in torrents, only to rush away in torrents, bringing destruction and death as it comes, and leaving an arid country, a baked and baking desert, after it has all-too-speedily gone. The second breeds malaria everywhere, poisons both food and drink with its stagnancy, and is the parent of fever and pestilence. The third has no pledge for the husbandman, and is as uncertain and fickle as the sand of the shifting desert.

Now what can timber do for such soils? And in what way? We may answer from either of two standpoints: From an investigation of the character, extent and services either of roots or of branches.

Regarding the first, roots, it is certainly unnecessary to remind this audience of their extent, their wonderful ramifications. If in the somewhat famous squash investigation, a single vine was found to have roots which aggregated fifteen miles in length, what must be true of those of the maple or of the elm? Any one who has gone through the annual misery of taking up the kitchen drain, only to find it stopped with dense masses of roots from the neighboring apple-tree, will doubtless be willing to assent to the statement that it has no less than five hundred miles of fibrous feeders. I don't really know about the truth of this—bût I do know about the drain! And if it is not quite five hundred miles it comes dangerously near it! However that may be, a very little thought will assure you that these roots accomplish a great work and a very beneficial work in all soils.

In the impervious soils they create natural water-ways; channels by which moisture is carried to great depths, and extended over large areas. With a force that is simply resistless they permeate every cubic foot of ground, almost every cubic inch—piercing it in ten thousand directions, conducting moisture to points almost as destitute of it heretofore as is the center of solid rock. This forces a process of disintegration more sure and more lasting than anything man has ever yet dreamed of accomplishing. This process is true, also, to a greater or less extent, of the impervious subsoils—though the benefit depends largely on the depth of the pervious soil and its sustaining power.

In the pervious soils, roots form a net-work of obstructions to erosion, holding the moisture in check, forming a sort of anchorage for the soil itself, and detaining either natural or artificial fertilizers till they have done their work. No one ever knew a timber-lot to wash over to another man's farm; but it is not at all a rare occurrence, especially in a hill country destitute of woodland, to find one's cornfield of the previous night spread like a giant plaster all over a neighbor's meadow!

Now what can be done for the soils by the leaves and branches? First—and I follow the order which presents itself to the unscientific observer, the farmer himself, for example—the leaves and other refuse from the tree form a dense packing, a mass of decaying vegetable matter, which both protects and stimulates all natural forces and qualities of the earth. Acting like a huge sponge, it takes up quantities of moisture and holds it in direct contact with impervious soils, softening them, hastening the process of disintegration already begun by the roots, and detaining rainfall that would otherwise drain away before it could follow the roots to their fibrous tips. Further, both this packing and the leaves still on the trees modify the effect of the sun's rays in summer, while the dead mass is a great protection against the rigors of more inclement seasons. The result is highly beneficial, and is almost enough in and of itself to change the nature of the soil.

In the case of pervious soils, the effect of shade in summer and of warmth in winter is as marked as under the conditions first mentioned—while even more than in impervious soil does the dead mass tend to enrich and give firmness and consistency to what was before of somewhat doubtful value; even when not, as in the huge sand dunes which have been so successfully treated, a mere desert waste.

Further, and it is no small gain, both leaves and branches protect the soil from the violence of storms. The weight of falling water is greater than most of us imagine, and the impact of *driven* water, as in what we very aptly call "a driving storm," is still more forcible. It is well known that with soil like much of that in our own State, the effect of a hard rain is to make the surface even more impervious. Light soils, even when not washed away, are badly broken up, and all vegetation more or less injured—being uprooted by the recurring strokes or plashes of the columns of moisture. But when these swift-recurring blows are broken by trunk and branch and leaf, the damage, if any, is very slight, and generally such as will repair itself in a few hours at farthest.

It is largely through this work on the different soils that the forests do so much for man. The general effect on climate is very marked. Not only is moisture retained below, but the upper air is filled with that which has been taken up by the roots, and thrown out through the leaves by evaporation. This process, like all others in nature, is perfect in its methods and results. A very practical proof exists in the factory of the Willimantic Thread Company. A certain degree of moisture in the atmosphere is desirable. Dampening the "fuzz" of cotton or linen "just right"—a very indefinable degree!—makes a given quality of thread with some twenty per cent. less revolutions of the spindle than will accomplish the same results in dry air. The company tried many methods to bring about this result, without success. The floors were dampened, large dishes of water were ranged round the rooms, cloths wrung out in water were hung against the walls—but all to no purpose. Finally, a bright-witted fellow filled the window-seats with plants—and the work was done!

The general temperature is rendered more equal. Trees in and of themselves temper both heat and cold. I will not weary you with the details or statistics of experiments in this direction; but it has been proved that when placed near a tree, a thermometer shows a lower range of the mercury in summer and a higher range in winter than if the exposure had been in open field. Every one knows how gratefully cool the recesses of a forest always seem in summer-time; and nearly everyone knows that men work with perfect comfort for hours among timber in mid-winter weather so cold as to make exposure in an open field even dangerous. There can be no doubt of the fact that this influence extends outside the timber-belt as well as within it.

The general effect on climate, though somewhat complex and not yet fully understood, is shown in another way. The western continent is cooler than the eastern, along the same latitudes. It is hard for us to remember that Philadelphia, Madrid, Athens and Constantinople are substantially on the same line; or that the same is true of St. Petersburg, Stockholm, the most northern and inhospitable point of Labrador, and the Alaskan peninsula; that the latitude of New Orleans and Mobile is that of Cairo and Delhi. Making all due allowances for the effects of that rather unknown quantity, the gulf stream, unquestionably the differences in favor of our continent are largely due to the absence of great central deserts, with their arid and shifting sands, across which flow air-currents hot as furnace-blasts—their burning breath penetrating even remote tropics. Something of the same phenomenon can be detected in following the isothermal lines within the United States. If you will trace their course on a map of the entire Union, you will find that they bend and twist in a way that closely follows the lines of the great timber-belts still remaining within our domain. I can only make this suggestion, leaving you to study either geographical or isothermal charts; over which a most interesting and a most profitable hour may be spent by even the most "unscientific" citizen.

Trees, too, are the natural home—really the only home—of birds; the farmer's chief friend, all grumbling to the contrary notwithstanding. It is scarcely questioned now that in an open country insects which are elsewhere picked up by our feathered constabulary, seem to flourish most destructively. The case of Birds *vs.* Worms has not yet been finally decided; but there is little doubt that the verdict will be on the whole in favor of birds; and that insects, like the Chinese and other offensive partisans, must go. Woodland is needed, to enforce the decree.

Nor is this all. Certain migratory insects—it becomes a Kansan to speak very mildly of our sometime visitors!—certain migratory insects, whose methods of dealing with the property of others are somewhat—somewhat—free, as one might say, and yet who are not wholly nor selfishly rapacious—they did leave a few peach-pits, didn't they? certain migratory insects—the *Gryllus agilis*—very! or the *Gryllus vulgaris*—peculiarly so! or the *Gryllus viridissimus*—a "British emissary," if I remember rightly! or, the *Migratoria lo-cus-ta*, which I think is the *right* name!—these pass over a well-wooded country in silent disdain. Nor are they the only enemies of the farmer whose ravages are stayed by a timber-belt. What might very properly be called an epidemic of grain-destroyers is rarely known where fields are separated by woodland, or even, in some instances, by triple hedges.

There is still some question as to the effect of forests on electrical conditions, and on the movements of storm-centers; but the weight of evidence is at present in favor of beneficent action. It is quite certain now that hail-storms rarely originate above any large tract of timber; and almost as clearly established that the force of such storms is broken in passing over such a forest. It is well known that electrical phenomena are more or less dependent on moisture and vegetation; and the woodland furnishes both. The popular belief that cyclones, tornadoes and "twisters" are never known in a timber country, is not entirely well founded; but it goes almost without saying that such storms rarely *begin* in such a country, and that their strength is soon spent when attempting to traverse it. On the contrary is but a single sentence, to my knowledge, in the whole literature on this subject; yet that from as sound a work as the Cyclopedia Britannica. In a sketch of the island of Mauritius, it says: "Hurricanes are not as violent as once, *because of the destruction of the forests, and therefore a drier condition of the atmosphere.*" I quote this rather as a curiosity, than as having any special authority back of it; and would add that in other and more scientific articles, the same cyclopedia certainly leans towards an opposite conclusion.

The great question, however, and that in which we as Kansans seem peculiarly interested, is, "What can forests do for man in the way of affecting the water supply?" In a certain sense, all else, though important, is subordinate to this. Without springs, small streams and rivers, a country becomes uninhabitable. Man may artificially accomplish much in the directions already named, without the help of timber. Soil may be broken by the plowshare and pulverized by the harrow, and perhaps superficially even more effectually than by the spreading roots of trees. Artificial fertilizers may take the place of more natural processes. Walls and embankments may protect hillsides from too rapid erosion. Shelter for stock may be provided—is provided—in many ways aside from timber-belts. Insects may be fought without the help of birds. But man cannot water the earth. Even when Nature lends him a helping hand, the process which he somewhat grandly calls irrigation is unsatisfactory, costly, and unreliable. Outside of this, he can do almost nothing. What a clear picture of this helplessness Starr King has given us:

"Just think how much expenditure of mechanical strength is necessary to water a city in the hot summer months. What pumping and tugging, and wearisome trudging of horses, with the great sprinklers, over the tedious pavement. But see with what beautiful and noiseless force Nature waters the cities! The sun looks steadily on the ocean, and its beams lift lakes of water into the air, tossing it up thousands of feet with their delicate fingers, and carefully picking every grain of salt from it before they let it go. The soft outlines of the clouds hem in the vast weight of the upper tides that are to cool the globe, and the winds harness themselves as steeds to these silken caldrons, and hurry them along through space, while they disburse their rivers of moisture from their great height so lightly that seldom a violet is crushed by the rudeness with which the stream descends."

What then can the forest do for man in this matter?

In the first place, it cannot be repeated too often that the forest is a great store-house of moisture. The refuse, which I have already mentioned, becomes saturated, and aside from what it thus retains it is, in connection with the living foliage, a perfect protection against too rapid evaporation. The phenomenon of a hard rain on the mountains with no perceptible rise in either springs or brooks, and that other phenomenon of a prolonged drouth with no perceptible diminution in the quantity of outflowing water, are constantly recurring, and have this explanation. Leaf and bark must first be saturated. Then the moisture falls gently down on the sponge-like mass at the roots. This is filled. Then with the ground beneath permeated with roots, and softened by the upper deposit, the rainfall is gathered deep in the very heart of the hillside, to find its way out, slow and clear and cool, through the openings that both man and beast know so well. These are fed by accumulations that would be almost impossible and unknown but for the forest, and the process just briefly described. And these accumulations are essential to the welfare, even to the existence, of man. Neither the accumulation nor the distribution can possibly be accomplished in any other way. The proof lies in the fact that where forests wane, all the conditions of life change for the worse; and where forests are wanting, life rapidly degenerates into mere existence.

Do you ask for examples or proofs? They are so many and so striking that one only hesitates as to the choice. The Euphrates once ran bank-full, with constant overflow; fed by the springs and streams of the Armenian forest. That forest has disappeared, and the mighty river has dwindled to a slender thread that is almost lost in the sands of its own bottom. Its banks are lined with a jungle of stunted growth, and the interior of the great geographical basin is destitute of either animal or vegetable life. The river Scamander, which was navigable in Pliny's time, cannot be found at all; nor can the great cedar forests which then covered Mount Ida—the source of the stream. The people of Dubaté, in New Granada, have for years witnessed the steady subsidence of two lakes near the city, as the timber which economized and regulated the streams that fed these basins has been removed. Several bodies of water in the same vicinity, and existing under almost precisely similar conditions except that of deforestation, show no change in their volume. Even more striking has been the experience of Nueva Valencia, in Venezuela. This city was founded in 1555, about a mile and a half from the shores of Lake Tacarigua. The greed of man made haste and waste with the surrounding forests; and when Humboldt visited the city, in 1799, the lake shore was nearly four miles away. A friend who spent the fall of 1866 in Venezuela told me that under the influence of second-growth timber the waters had again approached the town, though they had not reached the old lines. Careful experiments show that there is not nearly as great a volume of water in either the Oder or the Elbe as before the great tracts of timber about their sources had been so thoroughly cut over. There is also in the case of these rivers that other sure sign of deforestation—a sudden rise and fall after heavy storms, with disastrous results; something of which we can find almost no record in an earlier day. It is a well-known historical fact that the Romans gave to Orleans a bountiful supply of water, conducted from the fountain of Etruvée; but the fountain cannot be found to-day, and nearly all the streams on that side of the city have dried up entirely, or have but a slight flow during a fraction of the year. The forest has been almost entirely removed! But on the other side of Orleans, where there has been almost no clearing, the streams are as they have been from time immemorial. The Durance, a river of France, had for many years been a constant menace to all who lived along its banks, or even within its basin. Its rising was swift and disastrous, and it came to be known as the most dangerous river in the realm. But when the government began to give attention to forestry, the chief timber plantations were formed round the head of the Durance. Soon the stream began to lose its frightful character, and even in the summer of 1875, when so much suffering was caused by floods, the river gave little cause for anxiety; nor has it even threatened danger since. The island of Mauritius, to which reference has already been made, was once a mass of verdure, filled with springs and brooks and large streams. Later it was cleared, and laid out in large sugar plantations. The streams at once began to shrink, the springs dried up, and it was soon difficult to obtain good drinking water at all. For thirty years it was swept by frightful epidemics, thirty thousand inhabitants dying in a single season. After a rain the small streams became terribly swollen, and carried devastation and death throughout the island. Partly through neglect and partly by deliberate intention, large tracts of land were allowed to return to their original condition; and already the beneficent effects of the second growth have been seen in a decided mitigation of all the evils referred to. Ascension Island was once barren, and no ingenuity could discover water sufficient even for the garrison; the supply was brought from Good Hope, and every drop was precious. But tree-planting was a necessity for the sake of shade; and tree-planting has secured an ample supply of good water in this formerly desert spot.

Such illustrations might be multiplied indefinitely. Permit me to add one more, and that because of its simplicity, and because it undoubtedly represents the experience of many in this hall. The old hillside farm in Vermont, on which I received what often seems to be the best part of my education, was noted for its delicious and abundant water. It was bounded on the east by the Battenkill river; a stream navigable for a canoe-load of two — to my certain knowledge! — and in which even seven or eight could be safely carried under pressure — not just the same kind of pressure! — without danger of sandbars or similar obstructions. It was not one of those amphibious streams in which the bottom frequently comes up to the top to breathe! Skirting the foot of the hills was a line of springs, known to all the country round. There was the large "Orchard spring" just south of the highway. Near the bridge was "Cold spring," and within a hundred feet distance "Trout spring" and "Middle spring" sent out waters that could be dipped with a pail without "rilin'." A hundred rods further north was the "Stock spring," where cattle, horses and sheep were driven all winter long. Down the south side of the farm ran "Chestnut-hollow brook." Along the roadside was a small trout-stream, delighting both eye and ear — aye, and nostril as well, with the delicate odor of mint. Down through the center of the estate came "Mill brook," which never failed us — leaping to the wheel of industry with a song day after day, in heat or cold. On the hillside, in the pastures, were springs so numerous that they were never named. During this last summer I went all over this ground again — as not before in almost twenty years. The river had dwindled away almost beyond recognition. The springs were either dry, or but shallow pools of tepid water. The wayside brook had disappeared. The mill was idle, nor could it find power more than five months in the year. The pastures were dry and brown. And the cause was perfectly plain. The mountain had been sold to charcoal-burners, who had stripped it of its verdure. The moist and sponge-like mass which had been my delight in many a summer's ramble had dried up, had been burned up, or had literally blown away. The moist and porous earth had become hard and seamed like rock. Erosion had laid bare large ledges of stone. Ravines had been deepened, and huge patches of sand and gravel here and there in the meadows once watered by the brooks, showed only one of the disastrous effects of sudden rise and mad overflow. Had I never heard a word nor read a line of this discussion, there could have been but one deduction from the facts thus painfully before me! — deforestation was doing its sure and never-failing work.

Whether depopulation is the necessary result of deforestation cannot perhaps be determined. Such great changes are rarely wrought by a single factor. But that deforestation and depopulation have gone hand in hand cannot be questioned. Think of the mighty peoples once filling to overflow the vast plains of central Asia Minor. These are now trackless—desolate. Recall the great cities: Babylon with its palaces and hanging gardens; Ispahan, even in the seventeenth century twenty-four miles in circumference, with a hundred and sixty Mosques, forty-eight colleges, eighteen hundred grand caravansaries, nearly three hundred public baths, and its streets thronging with nearly six hundred thousand souls; Bagdad the beautiful and the mighty;—what are they now? Greece has but one-twentieth of the population that once lived contentedly on her soil. As late as the year 670 what is now Tripoli had a population of six millions, of which less than three-fourths of one per cent. remain. Spain retains but seven per cent. of her grand forests; and from Gibralter to the Tagus maintains but one-tenth of her former population. So marked and so swift have been the results of deforestation in the old Castilian monarchy, that Rentzsch, the German historian, says "the political decadence of Spain is largely due to the destruction of the forests." Without further illustration, it is sufficient to remark that the physical and climatic influence of forests and the importance of all due protection to woodland have stirred to vigorous activity nearly every civilized government on earth. And we sit still with folded hands, justifying our conduct by quoting as a truth the scornful remark of the old French Abbé: "There is a sort of special providence that watches over little children, old women, and the people of the United States of America"!

For what are we doing to-day! Stripping the country of timber in every direction, with a recklessness and a wastefulness of methods and an utter indifference to either the teachings of the past or the known wants of the future that seem madness. Not content with satisfying our own demands, we are exporting large quantities of lumber which should remain on the stump. Farmers clear more land than they can cultivate, in the face of a wealth of open public domain. We burn and trample down and otherwise destroy thousands of acres of vigorous shoots every year. Private estates are wasted; public lands are robbed. The Northern States have about twelve years' supply of timber at the present rate of cutting. When the same pressure and exhaustive processes are brought to bear on the South, the forests of that section are doomed in seventeen years.* An equivalent of fifty thousand acres of the best Wisconsin timber-land is cut every year to supply Nebraska and Kansas alone. Ohio has not a merchantable walnut tree in the State, and her Governor officially announces that two hundred years will scarcely make good the ravages of the last half-century. The forest crop of the United States for 1880 was estimated at $700,000,000—almost entirely denuding not less than ten millions of acres. Wood is used for fuel where we should use coal; for shoe-pegs, where we should use metal; for fences, where we should herd or soil our cattle, (the fences in Ohio are said by competent authority to be worth more than all the cattle); for telegraph and telephone poles, when the wires should be under ground; for city walks, where we should use brick or stone or asphalt; as pulp in paper, thereby giving us cheapness at the expense of both durability and comfort; for railroad fencing, at a cost of about eight hundred dollars a mile, only to be buried in winter and burned in summer—when a live fence would cost far less and do far better work. In these and in a hundred other ways, all avoidable and most of them inexcusable, we waste our substance. A clever statistician has estimated that when our inheritance has been exhausted, the merchant marine of the world could not carry us lumber as fast as we now use it. This, too, remember, is at the close of the first century of our national existence; when we have a population of but about sixteen to the square mile. What will be our condition at the close of the next century if this recklessness continues?

What shall we do about it? The land of this country is largely in private hands. It will soon be entirely so. Our public domain is shrinking with marvelous rapidity.

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*See Appendix A.

Perhaps it is already true that whatever is done in the way of timber-culture must be done by the owners of the soil. We are very slow to extend the powers and duties of either the National Government or that of the State. We naturally and properly dread multiplying either National or State officers. But there are some things which we *can* do as individuals, and some things which we *must* do through the State.

As to the first: I have already noted many ways in which we may be more frugal, and keep something in store for that day of greater emergency which is sure to come. There are certain other directions in which we may move without waiting for the action of the civil authorities. I mention these in no special order, as they have no logical connection; but as they have been jotted down from time to time during the years in which this topic has urged itself on my attention.

A double or triple row of trees can be grown around a farm with scarcely any loss of land, and at very small expense. Such rows could also be set across a farm in each direction—possibly so as to inclose each forty acres, certainly each eighty. You know the practical value of such hedges or wind-breaks better than I can tell you. In the West, with our broad prairies almost destitute of timber, with nothing to break the gathering force of storms, with no landmarks for a traveler, with no shelter for man or beast, these are the most grateful improvements that man can make on nature. I do not propose to discuss the money value of such timber-belts, either to the farm or in the lumber market. It would be easy to prove (from a collection of newspaper clippings!) that a double row of walnuts round a quarter-section adds ten dollars per acre for each of twenty years, or makes the farm worth $335 per acre at the end of the first generation, exclusive of all improvements! I shall not undertake to show you—though it were an easy task!—that a triple hedge of catalpa will in ten years cut from each shoot two ties, four posts, three telegraph poles, a whipstock, and a fish pole—and leave the hedge as thick as ever! Nor do I intend to tell again the story of that Texas gentleman who only eight years ago set out a forty with black walnut trees; has had all his firewood from the tract for five years; secures an annual income from the sale of the fruit of $25 per acre, or $1,000 per annum, spot cash; and has just been offered—oh, I cannot remember the exact figures—anywhere from $500 to $1,500 per acre stumpage for the entire lot;—stumps, land, and privilege of further romancing to be retained by the Hon. Ananias Liebold, the original owner! No; being nothing, according to common report, but a "pale and sickly pedagogue," and one of "those wretched *theorists*," I shall leave this practical, pocket-book side to be presented by that guardian of public morals and higher education—the press!

My only purpose is to call your attention to the fact that there are dollars and dollars in timber that is not intended for the lumber market. To a Kansan, a wind-break always means a great deal; and once in a while, yes, *twice* in a while, means everything. When a forty has been plowed and sowed with the greatest care, and the good farmer, after listening all night to rattling shingles and falling bricks, and trying to sleep with one eye open and one leg of his pants on in order to be able to make a timely break for the cellar door, rises to find seed, soil, and everything—except the mortgage!—banked up against his neighbor's barn, then he becomes a devout worshipper of the forestry commissioner! Nor should we forget, even under somewhat more favorable circumstances, the effects of a *drying* wind. It is a well-attested fact that evaporation under such air-currents often proceeds even more rapidly than under the rays of a midsummer's sun. Roads pass from mud to dust in a single day, and the soil of fields disintegrates till it is like the sand of the desert. A forest renders such a condition almost impossible; and a stiff wind-break will go very far towards mitigating the evil. Kansas, especially in its western half, has supreme need of all such artificial barriers to what has more than once entailed severe loss on whole counties. Nor is the shelter of stock to be overlooked. Careful comparisons show that stock that is kept in the open field does not take on flesh nor growth as rapidly as that which is provided even with a slight natural shelter. Cattle on the ranges will, with the instinct of self-preservation strong within them, move for miles seeking the timber or something that will break the force of the storms of winter. There is every inducement, therefore, for the planting of such hedgerows.

Second: Much land that is now called waste land might very profitably and at very slight expense be given to timber. When one remembers that for forest purposes at least three hundred trees can be grown on an acre, one can easily see the possible results of time and patience. The Mennonites of our own State are said to secure all their firewood by simply thinning their forests after seven years' growth. Ten acres would certainly pay a good interest on the cost of the land, and the taxes besides—saying nothing of the benefit to the farm in other ways.

Third: Much land now overrun by cattle and not yielding twenty-five dollars a year in actual pasturage, would become valuable if simply let alone. The damage caused by cattle is almost incalculable. Any one who has tried to raise shrubbery in an average Kansas town can tell you something about it! But in and near a timber lot they trample out and browse out that which if left to itself would soon be worth many times their value. I don't believe it pays to browse anything—but a boy! Acres and acres have been redeemed by this letting-alone process, and to-day are thick with timber.

Fourth: More intelligence can be shown in cutting timber. There is such a thing as a timber crop, just as there is a wheat crop. Maine is an excellent example of what can be done in this way. Maine without timber is Hamlet with Hamlet left out! A few years ago the people became aroused to a sense of their loss and danger arising from deforestation, and a healthy public sentiment and renewed discussion and investigation have gone far towards remedying the evil. Trees are selected with care, are felled with the saw rather than with the axe, are cut close to the ground, are so felled as to do the least possible damage to the surrounding trees, and are cut in such numbers and on such ground as will best promote the growth of the timber which remains. There is such an expression in a lumberman's vocabulary as "full growth"—and as far as possible no trees are cut till this has been reached. As examples of other experiments in this direction, might be quoted among many others quite as noteworthy, the royal forests of England and the large tract of Scotch fir in Strathspey, Scotland, belonging to the Earl of Seafield. The timber lands of the crown include about 125,000 acres, watched with the greatest care, though at much less expense than would generally be imagined, and yielding an annual cut worth about $170,000, with no perceptible diminution. The Seafield tract is so used as to permit the cutting of a thousand acres annually, on a rotation of sixty years. The annual repair is thought to fully equal the annual waste.

Fifth: A very little labor each year in removing tops and broken branches, and in clearing underbrush, goes a long way towards the prevention of extensive fires, and in the direction of stimulating growth. I have in mind just now a New England farmer who is a born woodsman, who has loved his forest since childhood, and who rarely goes through it except with axe in hand—to be used much as a gardener uses his shears. To-day he can tell you of whole "cuts" which are now possible only because of his watchful care; and he pats his trees and talks about them as though they were his children. As a result, his timber-lots are huge parks of most beautiful and valuable trees—while his neighbors' lands have been allowed to become thickets and impassable jungles of stunted growth.

There is one direction in which we can move, and ought to move at once—even before we leave this room! This is neither the time nor the place for a general discussion of the revenue system of this Government. But this much can be asserted without fear of contradiction, that no greater folly can be imagined than that with which we place a premium on the destruction of our forests. The inconsistency with which this is continued, while we hold conventions and appoint commissioners to nullify, if possible, the baneful effects of our own action, is pitiful in the extreme. Even the Kansas Legislature, wedded to the doctrines of the fathers and loyal to the traditions of party, has seen the folly of this measure, and demanded that our national delegation should vote for putting lumber on the free list. What is needed now is a repetition of the demand, and a public sentiment that will make the mandate good, no matter whose the head that must seek the basket on that issue alone! There is no plea, no extenuation for this folly. It is not building up an industry, nor creating a school for skilled labor. It is simply destructive, and employs nothing but common labor. Nor does it employ American labor. The most extensive operations are carried on by the use of Canadians, who remain here while at work, but spend their savings on the other side of the line. The lumbermen of the Northwest have long since thrown off the mask, and have changed the whine of "Protect American labor," into the demand "Give us a bonus of two or three dollars a thousand." Our pine timber lands are sold by the Government at from a dollar and a quarter to two dollars and a half an acre. Evidence taken before the tariff commission* shows that these lands yield from five thousand to fifteen thousand feet of lumber per acre, and when cleared are worth more for farming lands than the original price paid. The Saginaw men testify that this lumber is worth $4.50 per thousand, *standing* — which means that the Government is selling these men lumber worth from $22.50 to $67.50 per acre, for $1.25 or $2.50, and is throwing in the title to the land as a bonus! And yet they ask for more protection! $14,400 net lowest profit to the section without raising a finger; the title to the land a bonus; and the farmers of Kansas taxed annually something over half a million of dollars to help these poor beggars along! And this, too, when the dangers of deforestation are constantly menacing us. It is high time that all this is stopped, and that these howling mendicants are denied the further patronage of this Government. Before we adjourn to-night, I want some honest man, with his soul filled with righteous indignation, to rise on this floor and put this motion: "*Resolved*, That we again call the attention of the members of our State Legislature, soon to assemble, to the absurdity, inconsistency and iniquity of the so-called 'protective' tariff-tax on lumber; and we demand that they shall immediately instruct the Kansas delegation in Congress to do all in their power to place lumber, except costly woods not grown in this country, and not entered as raw materials for purposes of manufacture, on the free list;" and I hope that this audience will pass it with an "aye" that will be heard by nine certain men not now within these walls.

What can the State do without increasing the number of its officials? How can it stimulate tree-planting by its citizens?

First, educationally. There should be required and established at the three great educational institutions courses of lectures on this special topic; a continual insistence on the vital importance of an intelligent perception of our danger, our needs, and of the possible remedies. I am prepared to go further, and say that at the institution of which this community, this State, is so proud, and which touches the every-day life of our citizens so constantly and in such a practical way, there should be an experimental station with a department of forestry, the head of which should be *ex officio* the State Forester; the burden of his duties being a close examination of the timber conditions of Kansas and the possibilities of the State in this direction, with wise suggestions as to either staying waste or increasing our woodland area. From such department should be issued frequent reports, to be scattered broadcast through the State, giving the results of the very latest investigations here and elsewhere. The Forester should also prepare a careful statement to accompany all reports issued by the State Board of Agriculture; and should be granted, as he undoubtedly would be, a very free use of the press of the State. Teachers in the common schools should be required to present the topic to pupils at least once each year. If by both law and education we are going to restrict ourselves to water, then we must be told how to get the water—or left to choke!

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*See Appendix B.

Again: The State may very properly encourage tree-planting by certain exemptions from taxation. For every acre set to trees in which the settings are not more than twelve feet apart, and are kept in good condition, Iowa exempts the sum of one hundred dollars from taxation for ten years after the trees are planted. Michigan instructs each highway commissioner to require the planting of at least fifty roadside trees each year till his district is all set; and allows for each tree twenty-five cents on the road tax of the one planting—though the total allowance must not exceed in any one year one-fourth of the entire tax. The trees are not to be more than sixty feet apart, nor less than twenty-three feet nor more than twenty-five feet from the center of the highway. Connecticut provides that plantations of specified trees not less than twelve hundred to the acre [it is to be noted that this is the way that timber starts naturally—in masses] and of an average height of six feet, may be exempt from taxation for ten years from date of notice and application. Dakota exempts from taxation for ten years any quarter-section with all improvements—the entire exemption not to exceed $1,000—on which there are five acres of timber planted and in good growing order and well cultivated. Nevada grants a bounty of ten dollars an acre, and ten dollars for every half-mile of roadside trees, for each of twenty years; provided there is successful cultivation and growth. Rhode Island adopts substantially the statute of Connecticut. Wyoming exempts $200 per acre for five years. Some difficulty has been experienced in securing honest work under these and similar laws; but the general results are on the whole favorable. They are certainly such as to encourage experiments in this direction. I know very well our own early attempts, nor am I ignorant as to the causes of our apparent failure. The laws just referred to have not accomplished all that has been hoped. But all failure has back of it the fact that we have not yet a realizing sense of our danger. Hence I put education as the very first condition of change. A healthy public sentiment can accomplish almost anything in this country—and almost nothing can be done without it.

The State can move also in the direction of swift and sure punishment for either negligence or malice in starting forest fires, or those that become forest fires; in such protection to wild land as will insure the natural growth of trees; in precautions against prairie fires, which are so destructive to the young shoots; and in the passage and sharp enforcement of such laws as will protect roadside trees from damage by stock running at large. In this matter it is about time to realize that roads are granted for public use for purposes of passing and repassing only; and by no stretch of either common law, common sense, or common decency, can one acquire a right of pasturage in the highway!

You will see that I have left very little for the General Government. I confess I do not see how it can do much more than has already been suggested. It has already legislated again and again for the protection of its remaining timber-land. What is needed is administrative ability and integrity to make this legislation good. I doubt very much if there should be a National Bureau of Forestry. We are in constant danger of becoming a huge bureau-cratic government, with a constantly-lessening sense of individual responsibility. If we had a dozen bureaus, we could not enter the premises of an individual citizen, and compel him to either cultivate or to refrain from waste. It is hardly needed in the way of general advice; as forestry, at least, is a "local issue." We can determine in Kansas what can best be done by Kansans for Kansas. If we do so determine, action on the part of the General Government is unnecessary; if we do not so determine, be sure that such action will be fruitless. The Department of Agriculture might very properly have advisory powers, and might use its printing and mailing facilities with excellent educational effect. It is very doubtful whether it ought to do more—whether it could do more.

No; the care of the forest, the rehabilitation of our soil, the restoration of that of which Nature has been thoughtlessly or willfully robbed—this must ever remain with us largely a matter of individual conscience, and for individual action. All possessions are in the nature of trusts; none more so than that of land and woodland—the two great conditions-precedent of existence itself. He who exhausts the soil, curses his posterity; he who unnecessarily destroys a single tree, does his part toward making the earth a desert. The problem of storing, regulating and distributing moisture is one of the most important demanding solution. Only by wise and united action—action characterized by large aims and great unselfishness—can we hope to succeed.

APPENDIX A.

(Compiled from U. S. Census of 1880, Vol. IX.)

States.	*Pine standing.*	*Spruce standing.*	*Cut of pine, 1880.*	*Cut of spruce, 1880.*	*Per cent.*
Maine	475,000,000	5,000,000,000	138,825,000	301,020,000	27+ 6+
New Hampshire	....	1,510,000,000	....	153,175,000	10+
Vermont	....	755,000,000	....	199,086,000	26+
Pennsylvania	1,800,000,000	*4,500,000,000	380,000,000	*300,000,000	21+ 6½+
North Carolina	†5,229,000,000	....	‡158,500,000	....	3+
South Carolina	†5,316,000,000	....	124,492,000	....	2+
Georgia	†16,788,000,000	....	272,743,000	....	1½+
Florida	†6,615,000,000	....	208,054,000	....	3+
Alabama	†18,885,000,000	....	245,396,000	....	1½—
Mississippi	§25,000,000,000	....	115,775,000	....	½+
Louisiana	‖48,000,000,000	....	84,500,000	....	1-6+
Texas	¶67,500,000,000	....	274,000,000	....	2-5+
Arkansas	**41,315,000,000	....	129,781,000	....	3-10+
Michigan	††35,000,000,000	....	4,400,000,000	....	12½
Wisconsin	††41,000,000,000	....	2,097,000,000	....	5+
Minnesota	††8,170,000,000	....	541,000,000	....	6½+
California	‡‡25,825,000,000	....	186,635,000	....	⅔+

*Hemlock. †Long-leaved Pine. ‡Including some Loblolly Pine. §Both Long-leaved and Short-leaved; proportion about 3 to 1. ‖Both Long-leaved and Short-leaved; in nearly equal proportions. ¶Long-leaved, Short-leaved, and Loblolly; in nearly equal proportions. **Short-leaved. ††White. ‡‡Redwood.

At the above rate, the pine crop in the seven Northern States will disappear in about ten years—in seven, if no allowance for growth is made. It should be borne in mind, that large tracts of Southern forests are either virtually inaccessible, or are only accessible under conditions which make the cost of lumber too high for present markets. There is a very grave question as to whether we have not already reached the time from and after which there will be a very general and steady rise in the price of lumber. Such a condition of the market cannot be far distant, at least with our present wasteful methods.

APPENDIX B.

(Extract from Tariff Commission Report, 1882.)

LUMBER DEALERS' STATEMENT.

New York, October 5, 1882.—The following statement in regard to the duty upon lumber, signed by the principal wholesale lumber dealers of Chicago, Ill., was ordered to be printed:

The Forty-seventh Congress having authorized the appointment of a Commission for the purpose of gaining information directly from the people upon the subject of the present tariff, the gentlemen comprising the said Commission, as we understand the scope of their duties, intending to recommend to Congress amendments to the tariff law, when it shall appear to them from good evidence that the people of the United States will be benefited by such changes, we believe most earnestly that the time has come when it would be greatly to the interest and good of the people of the United States to remove the present import tax upon lumber, which may conveniently be brought to them from the Dominion of Canada. In support of this argument we would say that the wonderful growth of the United States, and especially the development of that portion lying west of the lakes, has been due to the readiness with which cheap dwellings, barns, fences and granaries were obtainable through the plentifulness of a cheap building material, such as is found in the white-pine lumber supply. With the exhaustion of this supply the still vast unsettled prairies and fields of the West will, in a measure, cease to present inducements to the emigrant from foreign lands, the unoccupied overflow from the older States of the Union, or the inducements for development afforded by the building of railroads and other highways of commerce.

That the time is not far distant when the lumber supply of the Northwest will be practically exhausted, and that evidences of that exhaustion are even now quite apparent, will be disputed by no well-informed person.

It is but a few years since the value of standing pine of good quality averaged from as low as 50 cents to as high as $2.50 per thousand feet; the value of the same grades of timber has risen at the present time from $3 to as high as $8 per thousand feet, an average value being, probably, fairly stated at from $4 to $5 per thousand. This value is still further advanced to the consumer in the fact that a majority of the present timber supply is remote from streams, and consequently more expensive of access.

The efforts of the United States Census Commissioners to ascertain the extent of the timber supply of the United States have resulted in a report, under the sanction and approval of that Bureau, placing the timber supply of the three principal pine-producing States at about 81,000,000,000 feet, *or an amount equal to the demands of the country for a period of eight years,** based upon the present consumptive demand. Aside from the States of Michigan, Wisconsin, and Minnesota, the white-pine timber resources of the country are insignificant, and while the supply of other kinds of timber in the South and elsewhere is reported as adequate for the needs of a full generation, there is no other variety of timber which can take the place of or is adapted to the same uses as white pine, unless it be the cypress of the South, unavailable for many economic reasons, or the whitewood (or tulip), more valuable for other commercial uses than as a substitute for pine as a building material.

Aside from the supply of white pine in the three States above mentioned, in the Dominion of Canada there exists a quantity equal, according to the opinion of many experts who have considered the question, to the present remaining supply of the United States. We believe that it is in the interest of a good and wise policy to admit this timber to the United States free from the incumbrance of a tax. We assert that *this timber has cost*, and does cost, those who control it for utilization *a larger sum per thousand than was obtained by the United States Government* from those to whom the timber lands of this country were disposed; that *the cost of manufacture in Canada is not below the cost to the American manufacturer;* and that the average cost of transportation of a majority of that portion of the present Canadian pine which would naturally reach the United States market is considerably in excess of the cost of placing the native product in the hands of the consumer. *These combined factors preclude the possibility of any injury resulting to the American manufacturer from the admission of foreign lumber.*

In support of the first proposition, we assert that the liberal policy of the American Government has permitted the timber lands of this country to be purchased in fee simple at from $1.25 to $2.50 per acre. These lands are estimated in general to yield 5,000 feet of timber per acre, while a large proportion of them have and will yield from 10,000 to 15,000 feet per acre. The standing timber, therefore, has been sold by the Government at an average probably less than 25 cents per thousand feet, including the ownership of the land, which in many cases readily sells at from $5 to $10 per acre after being denuded of its timber, such land being found in many parts of Michigan, Wisconsin and Minnesota to be unsurpassed in value for agricultural purposes. From the land and timber for which the Government has received, at its highest established price, $1,600 per square mile, the manufacturer of lumber has realized, and is now realizing 3,200,000 feet of timber of an average stumpage value at the present time, as stated by the Saginaw manufacturers in an address recently presented to the Congressional Special Tariff Commission, of $4.50 per thousand, or $14,400 per square mile, to which may be added the market value of the land for agricultural purposes, which, if stated at $2.50 per acre, or $1,600, *leaves the case to be stated simply that the Government has presented $14,400 in timber to each purchaser of a square mile of timber lands.* This we esteem to be fully all the protection to which the manufacturer of the United States is entitled at the hands of the Government.

Comparing the policy of the American Government with that of Canada, we find that it is the policy of the latter to place its timber lands in groups of townships, which are offered to the highest bidder at public sale, at a bonus for the privilege of cutting off the timber. This bonus or privilege usually costs the purchaser not far from 35 cents per thousand feet, after which, under many and usually expensive restrictions, the government claims a stumpage duty of 75 cents per thousand on all timber actually cut, in addition to local taxes of about $100 per year per square mile, or an average of about three cents per thousand feet, a total stumpage cost of over $1 per thousand paid to the Canadian Government, the ownership of the land remaining in the government.

While, therefore, the American timber-owner, investing of necessity but $1,600 to secure 3,200,000 feet of timber, (actually securing nearly or quite double that amount, as a rule,) realizes from the value of his timber and the sale of his land $16,000, the purchaser of Canadian timber pays to the Government not less than $3,200, without any rebate, in the value of the land, for the purpose of securing the net quantity of 3,200,000 feet of timber. The Canadian lumberman, in a country less favorably situated for railroad transportation of men and supplies to the camps, is consequently at greater expense in his preparatory work, and as the contiguity of the two nations enables a ready interchange of labor, it follows that with a larger number of laborers, bred to the work of the lumber camp, the Canadian laborer seeks work on American soil whenever the rate of wages between the two countries is greatly disproportioned, thus compelling the Canadian employer to pay nearly or quite as high rates of wages as prevail in the more extended lumber regions of this country, if he would retain his laborers.

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*All italics are my own.—J. H. C.

The food markets of Canada are based in values upon those of the United States, so that in the staples which enter most largely into the business of lumbering, namely, grain for teams, flour, beef pork and beans for the men, the average expense of camp supplies is to the Canadian operator but little if at all less than to the American. In the running of logs to the sawmill the expenses again are not far from equal, the general comparison of streams in the two countries being, if anything, in favor of the American.

The capital invested of necessity in pursuit of this industry is greater in Canada in proportion to the extent of the work performed, from the necessity to acquire the large land limits, which alone can be obtained from the Canadian Government, the American Government selling as low as 40 acres at a cost of not over $100, while nothing less than a township is disposed of by the Canadian Government. The number of men employed is not less, per thousand feet produced, in one country than in the other, and the capital employed in sawmills will bear the same comparison. It would be folly to assert that greater intelligence enables the Canadian laborer to perform a greater amount of work in the sawmill than does the American, while it is a fact that by improved methods and machinery, more generally adopted in this country than in Canada, the cost of producing lumber is greater in Canada than in the United States. In the matter of transportation the Canadian again labors under the disadvantage of being, in the main, and especially in the western portion of the province, whence must come a majority of the timber, at a long distance from markets, whereas the American operator can utilize lake or railroad transportation at his pleasure, and with but short lines and a low freight rate. The disadvantages under which the Canadian operator labors we assert to be more than the equivalent of any superior advantages he may possess, so that it may with positiveness be assumed that Canadian lumber laid down upon the docks of Chicago or any other large distributing center, will have cost the Canadian as much, if not more, than the same quality of stock has cost the American manufacturer at the same point.

Having demonstrated, as we believe, that the American Government has dealt more liberally with the American timber owner than has the Canadian, pointing to the statement of the Saginaw manufacturers, before referred to, in which by their own admission the royalty on Canadian timber is $1.75, or nearly double what we have assumed it to be, as further evidence that our estimates are wholly within bounds, we next controvert the statement of the Saginaw memorial, in which the liberality of the Canadian Government in building piers, booms and slides is pointed out, by referring to the general policy of the American Government with regard to navigable waters, pointing to the recent river and harbor bill, appropriating an additional $17,500,000, *no mean proportion of which was devoted exclusively to improvements in the localities where the lumber interest is benefited to a greater extent than is any other individual industry.*

Analyzing the statement of the Saginaw memorialists, we have shown that while the Canadian lumberman has paid to that government from $1 to $2 per thousand stumpage on the timber cut by him, the American Government has virtually presented to the lumberman of this country each section of pine land, together with the timber on the same, of a value of $14,400, for the mere nominal sum of $1,600, or, as he can readily realize that sum for the stripped lands, has made him a gift of the timber for his labor in clearing it. The Census Bureau reports 1,649 lumber manufacturing establishments in Michigan, 234 in Minnesota, and 704 in Wisconsin, a total of 2,587; assuming for argument's sake that the number is 10,000, and asserting, as we believe, that no timber interests except those connected with the lumber manufacturers of the States named are to be affected by an abrogation of the tax on lumber, it would seem that after giving $14,400 with each section of pine land to 10,000 manufacturers of lumber, *it was now the duty of the Government to consider the interests of the* CONSUMERS *of lumber, represented by over 5,000,000 persons to each 1,000 manufacturers.*

These have a right to claim that the timber which has been donated to the manufacturers by the Government shall be provided for their use at a reasonable modicum of profit to the manufacturer. With a yearly destruction of the forests, the timber donated by the Government to the manufacturer has risen in value until it is no uncommon thing to hear of sales of standing timber at the rate of $8 and $10 per thousand stumpage, while the average price, as stated by the Saginaw lumbermen, is not far from $4.50. The average price in 1870 was below $1 per thousand. The consumer has been compelled to pay this difference, and if values advance in the same proportion during the present decade, *he will be called upon to pay to the manufacturer not less than $20 per thousand stumpage* on the timber *donated* by the Government.

When we consider that the annual manufacture of lumber in the three States mentioned exceeds 8,000,000,000 feet, and that this slaughter of the home forests means the destruction of 2,500 square miles of timber each year, and at this rate that there is but an eight-years supply to draw from, it would seem the part of prudence to begin to purchase some portion of our supply from those who have it for sale, before the time when absolute want shall force us to buy it at the sellers' asking price.

Some gentlemen claim that there are climatic considerations that have a bearing upon this subject —that the destruction of our forests will affect unfavorably the productive force of our soil; this branch of the subject we leave with those persons interested in agriculture.

The Saginaw committee claim that the settlers, by crowding in upon their pine lands to make their clearings for farming purposes, destroy by fire all their pine forests, and for relief desire to cut off the trees as rapidly as possible, so as to save them. We seriously question this statement, not believing that the average thrifty farmer seeks the pine belt in pursuit of his occupation, but from our own knowledge believe that the forest fires are in the main brought about in consequence of the accumulation of the limbs, bark and chips that become dry and easily ignited shortly after escaping from the lumberman's ax. Hence we should say that a good way to preserve forests from fire would be to stop filling them with bonfire materials.

The Saginaw memorialists say: "When our Government can furnish lands on such easy terms as does that of Canada, free trade in lumber might be nearer just." Having shown that our Government has been more liberal to the lumber manufacturer than to any other class of our citizens, and vastly more so than has the Canadian Government to its manufacturers, and having demonstrated that the cost of lumber to the Canadian producer precludes any possible danger of his entering into ruinous competition with the American manufacturer, *we respectfully submit that the short supply of native stock, and the growing demands of a mighty nation, the interests of 55,000,000 people in cheap homes, and manufacturing industries needing the consumption of pine lumber, imperatively demand that all restrictions should be removed from the importation of that limited quantity which the Dominion of Canada can supply to supplement our rapidly-decreasing timber resources.*

For the above reasons, and many others that might be given, we must earnestly pray that all duty upon pine lumber, lath and shingles may be removed, to the end that the people of the United States, and particularly of the States and Territories to the west of us, may improve the rich prairies, and at moderate expense construct their buildings and homes from the products of the forests of Canada, as similar material grown in the United States has become so nearly exhausted, and cannot be reproduced.

REPORT OF STANDING COMMITTEE ON FORESTRY FOR NORTHWEST KANSAS.

BY MARTIN ALLEN, HAYS CITY.

Scientists and explorers rarely discover any new truths. Facts, like fine fruits, are not made to order, but are found; and sometimes utilized by their finders, but not always. The finders and utilizers of new facts are, in this age, generally called *cranks*. They have always had a hard row to hoe: this has not only been true of nursery rows in horticulture, but it has been true in all the avocations of life.

Scientists are continually arranging and rearranging their facts, and sometimes adding newly-discovered ones. Under such new arrangements, the scientific truths of our time may become the foolishness of some future time, and the cranks of our age may become the heroes of succeeding ages. As illustrious examples of this theory, allow me to cite Jesus of Nazareth, who became to God's once-chosen people (the Jews) the greatest crank of his time. He was, in the most ignominious manner, put to death upon Mount Calvary, but for the last eighteen hundred years has been acknowledged and lauded by the most civilized nations of the earth as the savior of the world.

Galileo, upon the announcement of a new discovery, was threatened with death, and, to save his life, turned traitor to his convictions, and publicly renounced his cherished theory; yet it is upon this same theory that all the calculations in astronomy (the grandest and most awe-inspiring of the natural sciences) have for hundreds of years been made.

The ideas of Fulton, as late as 1804, were, by the savants of France, considered to be of the most unreasonable and visionary character, and those of Stephenson none the less so by the learned men of his own country; yet the cranky ideas of those two individuals now control the commerce of the world.

To show, however, the terrible fate of some of these cranks that have been unfortunate enough to open their lips and speak their convictions in our own age, two cases will suffice: that of Elijah P. Lovejoy, who was, in 1836, set upon and killed by a mob of the citizens of his own town, as a nuisance, unfit to be endured in civilized society. In 1866, only thirty years later, the people of the same town organized, not a mob, but an association, for the purpose of erecting a monument to his memory, because he was so great and so good a man.

And the fate of John Brown on the gallows at Charlestown, Virginia, (whose soul still goes marching on)—his name will no doubt be hailed by succeeding generations as the deliverer of a race from bondage.

These rearrangements of facts and ideas still go on. Men who grasp and promulgate great truths to-day, may live to find them great lies next year or at some future time. Facts in horticulture are by no means an exception to this rule, but they too have met with the same sort of convulsions. My own memory goes back to a time when fruit was considered unhealthy—that children, especially, who ate plenty of it, usually had worms, &c.; and it is true this was away back near the days when a certain class of physicians—commonly called doctors—considered themselves more scientific than other doctors; and used vegetable products only for medicines. Elder bark was one of their favorite remedies. For an emetic it was scraped upward; for a purgative it was scraped downward. Whenever the desired effect was not realized, the doctors would insist that the bark had not been scraped right. It never can be ascertained how many hundreds or thousands of valuable human lives have been lost by this and other equally foolish once supposed facts before they could be rearranged, their fallacy fully proved, and something better found to take their places.

Localities also have their facts, and thus it was that Dr. Kennicott (the most enthusiastic horticulturist of his time), upon the prairies of Illinois once said in my hearing, "A great truth east of the lakes may be a great lie west of the lakes." He might better have said, a great truth in a timber country may be a great lie in a prairie country, and *vice versa.*

Thus it is that localities also have their truths that do not apply to other localities, even in the same latitude or longitude. Certain things are true of localities bordering upon large bodies of water that are not true of localities remotely situated from such influences, and certain things may be true of highly-elevated regions that are not true in valley regions, and *vice versa.* These same conclusions apply to mountain and plain regions, and possibly even to long and short-grass regions as well.

To gather up, catch onto, arrange and make use of all this range of facts, and facts closely related to them, and apply them to horticultural use, is I conceive to be one of the grandest works of this Society; and a work in which none of us should weary, and in which we will all of us find ample scope for the exercise of our powers of observation.

The early travelers, explorers of and writers about the plains region of Kansas and Nebraska made frequent allusions to the country as a sandy desert, and often alluded to traveling leagues and leagues without finding any water: in most cases they simply failed to go where the water was. The result of such researches culminated in a series of scientific articles, appearing in the *Kansas Farmer* ten or eleven years ago, under the caption of "The Treeless Plains." One of the axioms laid down and foundations for this series of articles, was the assumption that in all this region in question "the little timber found was along the margins of ever-flowing streams of water, or in the horse-shoe bends of such streams." This was then believed to be true—is probably by most persons yet believed to be true—and a good axiom in science, whenever her researches are confined to books and work in the office; but such, allow me to say, is a false premise, hence the whole theory built upon it must fall.

The facts are, that from the Platte to the Arkansas, and from the ninety-seventh to the one-hundredth meridian west, the best timber, the most of it, including the largest trees and the greatest variety, are found along watercourses that do not carry water more than one or two months in the year. The two streams already named are at the north and south limits of my observations, and the largest streams in the territory designated; they are both fed by almost, if not entirely, perpetual snows at their head in the mountains; they are not only celebrated as the largest streams, carrying the most water, but also as having the least timber of any in the region under consideration. The two next largest and longest streams are the Republican and Smoky Hill, neither of them having much timber. The remaining principal ever-flowing streams are the Solomon and Saline—the two shortest, and having the most timber of these six named streams. This probably too-lengthy introduction brings me squarely to the question as announced in your programme: Why are there not more trees in central Kansas?

The trees we do have are mainly along watercourses and other points inaccessible to prairie fires.

This proposition needs no argument: A prairie country cannot also be a timber country. The annual fires that sweep over the country destroy all seedling trees that may have started. Even if such seedlings should, by some fortunate circumstance, be favored, by the fires not reaching them for a few years, and the seasons have been propitious, and a good, luxuriant growth has been made, and fortune seems to be favoring the little trees, the same circumstances have also induced a luxuriant growth of grass and other herbage, which, when the fires do come, makes the destruction of the little trees all the more complete; and this is one of the reasons why we do not have more trees in central Kansas. Another proposition, to wit: The larger the stream, and the more water it carries, the less timber it has. If I could only have had each one of you gentlemen to have accompanied me on a visit I made to the Saline in the northern part of Ellis county, in September, 1872, and have seen the destruction I that day witnessed, by the beavers, it would have settled this question. They seemed to have cut acres of young cottonwoods, from mere switches up to trees eighteen and twenty inches in diameter, on the southeast quarter of section 12, township 11, range 18 west. I say that had you been with me on that day, you would understand much better than I can tell you of one reason why there are not more trees in central Kansas.

When we consider for a moment that these beavers have been numerous, and for thousands of years have been in existence, and always true to their instincts in making and repairing their dams and homes, and consider that they are yet with us in Ellis county, and that most of the large trees left standing along the ever-flowing streams of water are marked by them, we well may wonder why any trees are left where these early scientists said they all would be found. I wish you would remember, in this connection, that these beavers only frequent the ever-flowing streams; remember this also as one of the reasons for the better timber along the watercourses that do not often have water in them—where the beavers never go.

Another element that enters into this proposition is the buffalo. Their tramping would no doubt have been sufficient of itself, without the prairie fires, to have destroyed any attempt of Nature to start forestry on the prairies. We are told by the early explorers of this country that the trails of this animal always lead north and south. The fact is these trails are—many of them—plainly visible. Now they lead to water, generally to these ever-flowing streams where scientists have located the only trees in the country. When we come to consider the great number of these huge animals, and their daily frequenting these ever-flowing streams of water for drink, it leaves us to wonder that there are any trees at all where these early scientists located all of them. The rush and contest entered into along the margins of all these streams, goaded on by thirst, engaged in by the great numbers known to exist, we might imagine sufficient to crush out every green thing along the streams carrying the most water. Trusting that these hints thrown out will sufficiently explain to this intelligent audience at least some of the means why we have no more timber trees in central Kansas, I will leave this phase of the subject, and proceed to discuss the possibilities of growing trees in this region.

The early settlers a lifetime ago in northern Ohio could not raise fruit, because small patches only of the dense forest had been cleared—there were no breezes to dispel late spring frosts, which usually killed the bloom. But later, when a certain per cent. of the forests were cleared off, fruit-growing became a success. Now, only about twenty per cent. of the original forest of the State of Ohio remains. The woodman's ax has done its work, and Ohio boasts no longer the humid and frosty atmosphere of sixty to eighty years ago; even excessive drouths and also floods are of late years reported from that quarter.

A writer in the *Southern Bivouac* has recently said: "If the progress of the destruction in the western Alleghenies should continue at the present rate, the yearly inundations of the Ohio valley will soon assume an appalling magnitude, and ere long the scenes of the river submergence of Louisville and Cincinnati will repeat themselves at Nashville and Chattanooga, while the summers will become hotter and dryer. In the Gulf States, the work of destruction has made alarming progress. Brooks and streams shrink from year to year, and warm summers expose the gravel of river-beds which fifty years ago could hardly be touched by the keels of heavy-laden vessels." It would appear from this that the same changes are taking place in all the timber regions of the United States that have taken place in Ohio. Swamps have become dry land, rivers have become smaller—even the old mill where I went with a grist hundreds of times when a stripling has stopped for want of water to run it.

What, let me ask, has become of all this water? Has it not been diffused and spread into the new and prairie regions? And has it not spread farther and farther each year as settlements have advanced, and changed to a very considerable extent the herbage of frontier regions as it advanced?

We have heard much about the change of climate, or rather a change to greater moisture, upon the Plains. We have seen something of it, but have always heard it attributed to the planting of trees, cultivating the soil, etc. Has not the destruction of trees in the East helped us quite as much or even a great deal more? It is a favorite theory, taught by men of science, that nothing can be wasted or lost. Then, allow us to ask, where does this moisture go that is lost to Ohio and the East by cutting off their trees and drying up their streams? Is it not fair to assume that what is lost in humidity in the East is gained to the West? Do not the records of the rainfall of the various sections for a period of years indicate this? Do not the crops of the respective localities indicate it? Do not the increased height, thickness, and verdancy of our grasses on the plains indicate such a condition? As a matter of fact, does not general observation show that Ohio and other Middle and Eastern States are becoming dryer as their timber has been cut off, and that Kansas and other prairie regions are becoming more humid as culture of their soils proceeds?

Observation leads me to believe that this whole list of questions should be answered in the affirmative; and this gives the greatest encouragement to tree-planting, and plainly foreshadows the possibility of making forestry a great success upon the Plains.

Yet for fear that these elements are working slower than some of us think, or if some of you are inclined to say that these are only fine-spun theories, and may be void of facts, to such I have something further to say. This is the class that has given us the old theory of the treeless plains, and tells us of the sandy desert, and of bare spots where nothing grows. Most of these stories when told had some semblance of truth in them. I well know of acres and acres of ground that were bare a dozen years ago that are well covered with herbage now; in this I cannot be mistaken, because good examples of it exist in sight of my own door. These changes are not owing entirely to a change in the rainfall, but there seems to be a changed condition of the atmosphere. In short, when we come to deal with solid facts — nothwithstanding the vast damage by the beaver and buffalo — we have left a few noble specimens of trees, showing that they always have flourished here. On the Fort Hays military reserve I have measured two Hackberry trees, respectively 30 and 32 inches in diameter; Green Ash, 23 and 24; Elm, 54 and 66; Cottonwood, known to be no more than 15 or 16 years old, 18 and 19. A huge Cottonwood growing a few rods from the Saline river, on section 24, township 11, range 19 west, was cut down three or four years ago. It was eight feet in diameter, and made ninety-six loads of wood. I have several times seen this tree before it was cut down, and although I am a native of a dense timber country, I think this had the largest diameter of body and the largest top of any tree I ever saw.

Do we need anything more to inspire us with confidence and hope for the future? Where trees of such great magnitude already exist, and the conditions for growing them being so greatly improved by the simple destruction of the forests of the East and other causes well known, why should there be such hesitation about planting?

With these suggestions allow me to close, with the hope that you may not misconstrue them and subject me to the epithet of a "crank."

REPORT OF STANDING COMMITTEE FOR SOUTHWESTERN KANSAS.

BY J. B. SCHLICHTER, STERLING.

The following fifteen varieties succeed almost anywhere in the southwestern portion of Kansas where there is sufficient rainfall to grow crops, viz.:

1. Black Walnut.
2. Catalpa (Western Hardy.)
3. White Ash.
4. White Elm.
5. Osage Orange.
6. Russian Mulberry.
7. Honey Locust.
8. White Maple.
9. Red Elm.
10. Ash-leaved Maple.
11. Hackberry.
12. Yellow Locust.
13. Cottonwood.
14. Red Cedar.
15. Sycamore.

For extensive plantations for profit, I would confine myself to Nos. 1 and 2. Where the Yellow Locust is not affected by the borer, I would plant it third in the order for profit. For low, dense wind-breaks and ornamental hedges, would plant Russian Mulberry. In dry and arid regions, would plant Hackberry and Honey Locust. On light, sandy land, plant Cottonwood as a shelter to break the wind off from succeeding plantations. A small plantation of Cottonwood trees on a farm will in a few years produce valuable timber for poles. If planted close they will grow tall and straight. If cut in early spring and set immediately they will make good posts that will last four or five years. In a wet season or on the low Arkansas bottom, many of them will grow and make live posts. But I would not encourage large plantations of it. The Russian Mulberry will grow wherever the Cottonwood will succeed, and will grow nearly as fast. While it will not grow into long poles, it will grow into posts nearly as soon as the Cottonwood, and will make excellent post timber, and the fruit it yields has a value for family use and for birds. It deserves to be planted largely, especially where Walnut and Catalpa do not succeed well. Osage Orange may be planted in alternate rows with Cottonwood, to occupy the ground when the Cottonwood is cleared off. It will soon grow into valuable timber.

The White Ash and White Elm have not yet been sufficiently tested in this part of Kansas. The White Maple, Red Elm, Ash-leaved Maple, Red Cedar and Sycamore deserve to be freely planted for roadside shade trees, upon lawns, door-yards, and school grounds. Every farm ought to have a few acres planted with Ash-leaved Maple for fuel. They will bear close planting—rows four feet apart and from one to two feet in the row. A plat of five acres planted in this way would soon furnish good fire-wood, and if judiciously thinned out it would also make a good sugar orchard at five years old. The sap of this tree is very rich in sugar. For a sugar orchard the trees should be grown with low, spreading tops. If grown in this way, the sap can be procured by cutting off the ends of the lower branches and hanging buckets to them.

OBSTACLES TO A MORE GENERAL PLANTING OF FOREST TREES, AND MEANS TO OVERCOME THEM.

BY J. F. MARTIN, WINFIELD.

One of the obstacles is a failure on the part of the masses to realize the importance of forestry, for there are to be found everywhere persons who cannot see any relation existing between forestry and successful agriculture. They have not known a scarcity of timber, and have faith that the supply will always equal the demand.

In treating the subject assigned me, I trust it will not be considered improper if I use some humble efforts in trying to remove the obstacles. It does seem if there is on this fair earth one spot where intelligent men exist, that a deep interest in this vital subject should be felt, it is on the treeless plains of our country, and especially of our own State. It would appear that consideration of material interests, bodily comforts, adornments of home, and desire to transmit a goodly inheritance to the generations that are to follow us, would be sufficient incentives to interest and activity in this great work. But, alas! we are surrounded by great necessities, and fail to realize that it is so.

In viewing the magnitude of the work, and the diversified means to be employed in its prosecution, a weight of responsibility and duty quite overwhelms us. We must, in accord with the divine injunction, "give line upon line," in the wisest manner possible, by talking, writing and personal example, and by invoking the powers that be, to aid and enthuse the masses to a course of action that will ultimately transform the desert into a garden.

In bearing an humble part, I will present some of the facts at my command in regard to forestry and its influence on mankind. I will leave theorizing to wiser heads.

It is an admitted fact that many parts of the earth, once densely populated, have been rendered partially or wholly uninhabitable by the destruction of its forests. Rains falling on the slopes, hills and mountain-sides from which the timber had been removed—meeting with no obstructions—would come rushing down carrying the surface soil with it; thus disastrous floods were the result, and the channels of streams and navigable rivers became filled with soil thus carried down, and then disastrous drouth would follow. The country, thus alternating between flood and drouth, failed to produce sustenance for man and beast; and cities standing on the banks of rivers that were once navigable, from which much of their wealth had been drawn, found that navigation had become uncertain and then impossible, until the inhabitants of country and city were compelled to migrate, leaving their native land desolate, and seeking a country where through the agency of forests a regular and sufficient amount of rain would make the growth of crops possible and for man to subsist. Think of the once fertile land of Palestine, and how when its groves were removed, and the memorable cedars of Lebanon that once crowded the mountains and guarded the water supply of its streams and rivers; now its rivers have become creeks and its smaller streams rivulets. The once fine climate is utterly changed, and the cultivation of its now scanty soil will not respond to the labors of the husbandman. The traveler may now stand upon the barren and rocky mountains of Lebanon and sadly look over this arid and desolate country. No cause for this is assigned by anyone, except the destruction of forests.

Hon. Emil Rothe, than whom there is no better authority on this subject, tells us that under the reign of the Moorish caliphs, the Iberian peninsula resembled a vast garden, yielding grain and fruit of every known variety, and of the most perfect quality and in endless abundance, and was thickly populated by a highly-cultivated people. But then the sierras and mountain-slopes were covered with a luxuriant growth of timber, which was afterwards wantonly destroyed under the rule of the kings; large herds of half-wild goats and sheep prevented the spontaneous growth of trees on the neglected lands. Now nearly all the plateau lands of Spain, being fully one-third of the entire area, are desert-like and unfit for agriculture, because of the scarcity of rain and the want of water. Another one-third of the territory is covered with worthless shrubs and thorn bushes, and affords a scanty pasture for the Merino sheep, the number of which is decreasing from year to year. The once delicious climate has become changeable and tough, since there are no forests to break the power of the scorching Salano and the cold Galego wind. The average depth of the fine rivers that cross Spain in all directions has greatly diminished. The government, well aware of the causes of the deterioration of the soil and climate, has lately made earnest efforts, partly to replant the old forest grounds, but has met with little success, it being very difficult to make trees grow on former timber-land which has been lying waste for a long time. It will take a full century's time, and necessitate an immense outlay of money, to restock Spain with sufficient timber. I will add that Mr. Rentzsch, in the Encyclopedia Britannica, goes so far as to ascribe the political decadence of Spain mostly to the destruction of her forests.

Mr. Rothe tells us further to look at Sicily, once the great grain reservoir for Rome. Since the island of plenty was despoiled of forests, it gradually lost its fertility and the mildness of its climate. The ruins of proud and opulent Syracuse lie in a desert, covered by sand which the hot sirocco carried over the Mediterranean Sea from Africa. A few isolated, well-watered and carefully-cultivated districts, of very limited extent, is all that is left to remind the tourist of the by-gone glory of Sicily.

Mr. Rothe, in referring to the State of Ohio, says: "Why is it that we cannot raise any more peaches in our State, while they used to bring sure crops not more than a quarter of a century ago? What is it that makes the climate, once so favorable for mankind and vegetation, more unsteady from year to year? Look at the woodless hills of southern Ohio, and you have the answer. Let the hills be deprived of the rest of the protection which the forests afford, and half of the area of the State will be sterile in less than fifteen years. The rain will wash the soil from the hilltops first, and then from the slopes; the limestone, which is now covered with productive humus, loam, and clay, will be laid bare; the naked rocks will reflect the rays of the sun, and increase the summer's heat; the north storms will blow unhindered over the country, and every change of the wind will cause an abrupt change of temperature."

A residence in Ohio of the first forty-five years of my life enables me to attest to the truthfulness of the above statements; and if space or time would permit, I could show in many ways how the climate has changed for the worse; and there can be no doubt but what these unfavorable changes are to be attributed directly to the wholesale destruction of the forests. Ohio, to-day, has but 19 per cent. of her area in timber, only a small portion of which is heavily timbered.

Mr. R. W. Phipps, of Toronto, Canada, in his excellent report to the Canadian Government, says: "The island of Ascension furnishes another remarkable instance. This island, some seven and a half miles long and six wide, was entirely barren when first occupied in 1815, and so destitute of water that supplies were brought from England and the Cape of Good Hope. Means have since been taken to plant trees and to introduce agriculture on the island, though not to any great extent. The effect has been remarkable. The island grows forty kinds of trees, where but one grew in 1843, owing to the want of water. The water is now excellent, and the garrison, and ships visiting the island, are supplied in abundance with vegetables of all kinds."

Mr. Phipps again says: "The island of St. Helena, the well-known scene of Napoleon's banishment, furnishes a remarkable illustration of the connection that exists between forests and rainfall. When first discovered, in 1502, it had heavy forests. The introduction of goats and other causes destroyed these woodlands until the island was almost denuded. The consequences were that in the last century we find accounts of frequent and almost periodical visitations of very severe drouth, occasioning various losses to cattle and crop efforts. Toward the end of the last century, however, the Governor saw the need of strenuous efforts. Gardeners were sent for, and trees from all parts of the world were planted, without regard to their character. The 'Pinas Pinaster' was soon very extensively planted, and several plantations of this still exist. The consequences of this were discovered a few years ago, as follows: For many years past, since the general growth of our trees, we have been preserved from the scourge, and drouths such as were formerly recorded are now altogether unknown. Our fall of rain is now equal to that of England, and is spread almost evenly over the year."

The same authority further says: "Khanate, of Bucharia, presents a striking example of the consequences brought upon a country by clearings. Within a period of thirty years this was one of the most fertile regions of central Asia, a country which, when well wooded and watered, was a terrestrial paradise. But within the past twenty-five years a mania for clearing seized upon the inhabitants, and all the great forests have been cut away, while the little that remained was ravished by fire during the civil war. The consequences were not long in following, and have transformed this country into a kind of arid desert. The watercourses are dried up, and the irrigating canals are empty. The moving sands of the desert being no longer restrained by lines of forests, are every day gaining upon the land, and will finish by transforming it into a desert as desolate as the solitudes that separate it from Khiva."

Allow me to refer you to the second chapter of the Bible, that you may find the privileges and duties conferred on man in regard to the forests, by God himself. The ninth verse says: "And out of the ground made the Lord God to grow every tree that is pleasant to the sight and good for food;" and the fifteenth verse says: "And the Lord God took the man and put him into the Garden of Eden, to dress it and to keep it." Since the rebellion in this garden man has ever been substituting and following his own wisdom instead of Divine wisdom, and ever to his disadvantage and peril. God never authorized man to destroy the forests.

Hon. Horatio Seymour, in his report to the Park Commissioners of New York, says: "The famous West India island of Santa Cruz is at the present moment suffering from the vandalism of its inhabitants; its eastern portion, which twenty-seven years since was rich, populous, and of tropical luxuriance, now deprived of its forests, has become dry, arid, and worthless. It is found to be too late to retrieve the previous error, for, of a thousand trees recently planted upon an estate on this island, not one survived."

The facts in regard to the island of Curacoa are still more interesting: "In the year 1845 it was found to be an almost perfect desert. Where (according to the testimony of the inhabitants) had once been a garden of fertility, abandoned plantations, the recent ruins of beautiful villas and terraced gardens, and broad arid wastes, without a blade of grass, showed how sudden and complete a destruction had fallen upon this unfortunate little island. The cause was the cutting down of the trees for export of their valuable timber. The effect followed even more rapidly than at Santa Cruz, as the island lies five leagues further south, and the heat is more intense. The rains have almost entirely ceased."

In regard to the effects of forests on the general health, the same authority says: "The effects of forests upon the general healthfulness of the State is great. The philosopher Boyle long since stated that in the Dutch East India island of Ternate, long celebrated for its beauty and healthfulness, the clove trees grew in such plenty as to render their product almost valueless. To raise the price of the commodity, most of the spice forests were destroyed. Immediately the island — previously cool, healthy and pleasant — became hot, dry and sickly, and unfit for human residence." It is known that the general clearing away of the forests in this country has had a tendency to raise the temperature in summer.

THE EFFECT PRODUCED BY FORESTS ON SPRINGS AND RIVERS.

Hon. Cassius M. Clay said before the American Forestry Congress, at Cincinnati: "I move in the sphere of experience with more certainty. I remember that when the forests were hardly broken here, springs of water were very frequent and perennial. The rivulets and creeks and rivers had a perpetual flow. These have now changed. The rivulets and creeks are now dried up in summer, and the fish so often caught by me in earlier years are gone. Not one spring in a thousand remains. Indian corn was generally planted in March, and the rains and exhalations of moisture from the surroundings made crops successful every year. Now the destruction of the forests has lost to us that bed of leaves which was a perpetual reservoir of water for springs, and evaporation; aided by the treading of the hard surface, the rainfall, if the same as of old, rushes off at once, sweeping the soil into the Mississippi delta. The dry winds absorb not only the ancient humidity of the air, but drink up the subsoil evaporation, so that our winters are longer, more changeable and unendurable. Corn can hardly be safely planted till late in April, and drouth too often ruins all, in spite of our best efforts."

Dr. J. D. Hooper, of the Royal Key Gardens, says: "The presence of forests plays a most important part in storing the rainfall, and yielding up gradually to the streams a continuous supply of water. Moreover the rain is retained by forests on the surface of the ground; it gradually permeates to the subsoil, and so feeds the underground water-bearing strata upon which springs and wells must eventually depend."

Dr. Marsh, in his work on "The Earth as Modified by Man," says: "The protection afforded by the forests against the escape of moisture from its soil by superficial flow and evaporation, insures the permanence and regularity of natural springs, not only within the limits of the woods, but at some distance beyond its borders, and thus contributes to the supply of an element essential to both animal and vegetable life. As the forests are destroyed, the springs that flowed from the woods, and, consequently, the greater watercourses fed by them, diminish both in number and volume. My own recollection suggests to me many instances of this sort; and I remember one case where a small mountain spring, which disappeared soon after the clearing of the ground where it rose, was recovered about twenty years ago by simply allowing the bushes and young trees to grow upon a rocky knoll, not more than an acre in extent, immediately above the spring. The ground was hardly shaded before the water reappeared, and it has continued to flow without interruption. The hills of the Atlantic States formerly abounded in springs and brooks; but in many parts of these States, which were cleared a generation or two ago, the hill-pastures now suffer severely from drouth, and in dry seasons furnish to cattle neither grass nor water."

THE EFFECT OF FORESTS ON TEMPERATURE AND MOISTURE.

Dr. Ernst Ebermayer, Professor of Forestry in Bavaria, states: "For five years, observations have been made in the kingdom of Bavaria, at seven different points, respecting the influence of forests on the temperature and moisture of the atmosphere, on the evaporation of water, and on the quantity of rainfall, etc. The facts are based on 5,000 different observations, made during the years 1868 to 1872, with the help of instruments most ingeniously constructed for that purpose. With these, twice every day, at fixed hours, and at all seven points, the temperature of the soil was measured for comparison, in the forests as well as in the open fields, at the surface and at a depth respectively of one-half, one, two, three, and four feet. According to these, the mean annual temperature of the *forest soil* is on an average 21 per cent. lower than that in the open fields, and the mean annual temperature of the *atmosphere in the forest* is on an average 10 per cent. lower than that in the open fields."

IS THE RAINFALL OF KANSAS INCREASING?

Prof. F. H. Snow, of the University of Kansas, read a paper on this subject before the Academy of Science, November 26, 1885, from which, by permission, I give the following summary:

Observations of the rainfall have been made at Fort Leavenworth for thirty-eight years, Fort Riley for twenty years, Agricultural College for twenty-four years, and Lawrence for seventeen years.

For the sake of brevity, I will only compare the rainfall in the last half of each of the above periods with that of the first half, which shows the following annual average increase: Fort Leavenworth, 5.21, or 20 per cent.; Fort Riley, 3.05, or 13 per cent.; Manhattan, 5.61, or 20 per cent.; Lawrence, 3.06, or 9 per cent.

There can be no doubt but what this increase of rainfall has been caused by the settlement of the State within the last thirty years, the population of which at the present time exceeds 1,000,000. The three greatest causes that have produced these favorable results are: the suppressing of prairie fires, the breaking and cultivation of the soil, and last, but not least, the growing of hedges, orchards and timber. They show also the equalizing effect of forests in lowering the extreme summer heat, and in lessening the extreme winter cold. The relative moisture is an average of 6 per cent. greater in the forest than in the open field — 9 per cent. in summer, and about 5 per cent. in the other seasons.

Do not the foregoing facts sufficiently demonstrate the importance of forestry to the welfare of mankind, and fully justify an intense and united effort in reforesting the Plains? I fear that the patience has been wearied in pursuing this part of the subject so far; but its importance, and the desire to impress the mind by giving such indisputable authority, is my only apology. In this address to the public, I trust one step has been taken in inducing persons to plant trees.

Another objection to engaging in tree-planting, is a belief that the supply will continue to equal the demand. This objection is not tenable, for however plenty timber has been, and is yet ample for present needs, it must be borne in mind that while our forests are rapidly disappearing there is an increased consumption, and with the increase comes a corresponding demand. If the Old World did not furnish an inexhaustible supply of timber to its inhabitants, can we expect that the forests of America will be exhaustless? Not so; history will repeat itself.

In regard to the supply and consumption of American timber, permit me to present a few facts. The census returns of 1880 show that of our States and Territories nine had reduced their woodland below 10 per cent., five between 10 and 20 per cent., eight between 20 and 30 per cent., eleven between 30 and 40 per cent., and four between 40 and 50 per cent. In the whole United States the woodland occupied 35 per cent. of the reported area. If all the woodlands of the States and Territories were evenly distributed over the entire surface, and could be thus maintained, the conditions would be favorable to the interests of man. But this is not the case. There are large areas of our country nearly or quite treeless. There are large bodies of timber lands in the South, especially the Gulf States, from which Kansas and Nebraska will soon be compelled to draw their supplies; also on the Pacific coast, especially in Washington Territory and Oregon. These forests, judging from their extent and the value of the timber, might, to the casual observer, appear well-nigh exhaustless; but the reason why they are intact to-day is because they have been less accessible than those equally valuable that are quite destroyed, and when these forests are penetrated by railroads they will be mown down like grain before the reaper.

We will give a few summarized statements from the tenth census report on forestry and the consumption of timber. There was during the census year ending May 31st, 1880, used for various purposes of fuel, 145,778,137 cords; value, $321,962,372. Charcoal used for various purposes, 74,008,971 bushels; value, $5,276,736. Capital employed and value of lumber produced, $233,367,729.

Add to the above the probable annual consumption at this time of 60,000,000 railroad ties, involving the destruction of perhaps 30,000,000 young trees, demanding 110,000 acres, and further add the destruction by forest fires, from all the various causes, of 10,274,089 acres, valued at $25,462,250, to which may be added nearly as many more acres destroyed by browsing animals, which appear to be the next most destructive agency, and we have figures that are well-nigh appalling. These figures only represent the probable destruction of forests in a single year.

It is stated in the census report, page 485: "Could complete returns of the forest crop of the census year have been obtained, it is not improbable that it would be found to exceed $700,000,000 in value." At the rate of consumption of the white pine, of the census year, the original forests will be destroyed in the State of Michigan in seventeen years, in Wisconsin in eighteen years, and in Minnesota in fifteen years. When the increasing demand and the destruction by forest fires are taken into consideration, the number of years will be materially reduced. Then Chicago will have lost her lumber trade, and in twenty years or less all mid-continental States will pay enormous prices for their lumber, and the people will be greatly concerned in regard to the future supply.

It should not be said that this is a subject pertaining exclusively to the agricultural class, for anything which vitally affects the welfare of the farmer and producer affects vitally the interests of the whole State, and demands the earliest and most earnest attention of the people's representatives.

Another obstacle to be removed before people will plant trees to any considerable extent, is a belief that it will not pay. There is strong disposition to make haste rapidly in making money. Such persons cannot wait for the slow returns that very many of the best investments require; they would rather rely on annual crops.

In the forest report for 1883, page 10, our honored President E. Gale estimates the total cost of planting, cultivating, etc., forty acres of Osage at $636.48. The thinnings from six to ten years would bring considerable income; perhaps equal or exceed the aggregate cost, including rent and interest. At the end of twenty years the value of the timber then standing he places at $20,000.

On page 12 of the same report, Rev. J. B. Schlichter estimates the value of the thinnings of a Walnut grove of eighty acres planted in the Arkansas valley at the end of ten years at $200 per acre, or $16,000; and this from cutting only one-half of the trees to give proper room for those that remain, which at the end of ten years more will be worth $400 per acre or $32,000 for the eighty acres, making a total of $48,000 in twenty years. By allowing 100 to 200 trees per acre to remain that they may attain a large size, a mine of wealth would continue to flow to the owner. He also admits that Catalpa Speciosa, Osage and Russian Mulberry grow more rapidly, and consequently will be more profitable than Walnut in a term of ten to twenty years.

The Forestry Manual for 1884, page 21, gives the estimates of Robert Douglas & Son. After giving accurate expenses for a term of twelve years, an annual profit of $9.25 per acre is shown.

Ex-Commissioner Gale, of Cowley county, has a grove of Cottonwood, planted five years ago, on which a clean annual profit of $17 per acre is plainly manifest.

On the 22d page is also given another estimate, where the writer refers to his own grove of Catalpas, five years old, set five feet apart, showing a net profit of $180 on less than one and one-third acres of rather inferior land. The writer further gives the measurements of two groves belonging to Mr. T. B. Hare and Mr. W. Pennington, planted nine and eleven years ago. Walnut, diameter, 7 to 9 inches; height, 35 feet. Elm, diameter, 6 inches; height, 30 feet. Soft Maple, diameter, 10 inches; height, 50 feet. Cottonwood, diameter, 15 to 34 inches; height, 65 to 75 feet. Catalpa, diameter, 9 inches; height, 30 feet. These trees were planted and still stand eight feet apart. You may form your own conclusions. The Catalpa grove, eight years old, belonging to Mr. J. Hahn, of the same county, consisting of 1,136 trees, occupying about seven-eighths of an acre, measured six to eight inches in diameter and twenty-four feet high. They would average three posts to the tree, making 3,408 posts. Estimating them at 15 cents each, it amounts to $511.20. The total cost of growing these trees, including rent of land, has not exceeded $40, which leaves a net profit of $417.20, or $58.90 per annum. If the timber is cut while in the dormant state, and but one sprout allowed to grow from the stump, the owner will have a tree as large as the present ones within six years; thus this grove may be made a perpetual income.

I have no hesitation in saying that he who plants and cultivates forest trees with the same common sense and industry that he does his corn, will make dollars out of his trees while he makes dimes from his corn. He who plants but a single tree enhances his personal interest, and thus far adds to the welfare of the State. But where are the capitalists who, like the Duke of Athol, will plant trees by the million, and thus assure to themselves and their children not only the appellation of millionaire, but the better title of public benefactor? Procrastination is an obstacle in the way of tree-planting for which I can prescribe no remedy, except, it may be, to send after them the persistent tree peddler. If he does not cure the habit, then there is no hope.

A lack of knowledge as to the best varieties of trees for a given locality, and how to plant and care for them, (and often added to this is a financial inability to procure the trees and meet other necessary expenditures,) are potent obstacles.

This Society is a great power for good, but, except additional aid is obtained, that it may become more closely connected with the masses, its labors and power, in an important degree, will continue to fail of its object. The deliberations and utterances are wise, and in a digested form it tries to talk to the people, but the telephonic connections are imperfect, and in thousands of instances it is utterly cut off, so that talk wisdom as it may, they are dead to its utterances, for they do not hear. The self-sacrificing labors of the best citizens of this and other States have agitated the subject of forest preservation and reforesting until the National and some State governments have taken commendable action, and a general interest is everywhere being felt. A great work has been done, but I conclude that the work already done is only preparatory to that which is yet to be accomplished.

We now have sufficient data, and with the accumulated experience of the past, to which, if were added the authority and resources of our State, a transformation from desolation to living beauty would speedily take place. One of the great needs, as I conceive it, is the preparation of a Forest Tree Manual, in its simplicity and comprehensiveness similar to the Manual on the apple, so ably prepared and presented at this session. It should contain, as far as possible, full and complete answers to the questions of what, when, where and how to plant and care for the future forests, also how to procure, preserve and grow seeds, cuttings and plants, together with other matters of interest, education and encouragement.

Who can answer correctly the vital questions above referred to? If reference is had to the section of the State lying east of the one-hundredth meridian, it may be done with some assurance of correctness, but west of that line, which embraces one-fourth part of the State, is a vast field for experimentation. Very few of the essential matters pertaining to reforesting that vast area are yet solved. This work is too vast, imperative and expensive for individual effort. It is here that the strong arm of the State should be put forth in establishing and intelligently maintaining

EXPERIMENTAL STATIONS,

that through this, the most successful agency, may be demonstrated, as speedily as possible, the many unsolved problems, instead of relying as heretofore on the feeble and frequently abortive efforts of individuals who are struggling for a home in a strange land, and surrounded by unknown conditions and possibilities, and who in addition are frequently bound in poverty. Let the Manual be made as complete as it may be now, and new editions issued from time to time, and by liberal legislative appropriations many thousands of copies should be printed and distributed, only by those who have a heart in the work. I presume no one will doubt the power of the Legislature to make appropriations for such purpose, but the difficulty is to get the people's representatives to learn that it is a more important duty to so direct and aid the settler in securing and permanently improving a home on the Plains, than it is to draw him hither by alluring advertisements. The State, through its competent agents, should be able to inform him what kind of crops can be relied upon, and what will most probably fail; also, what kind of forest and fruit trees will succeed; then, and not till then, will the most rapid development be made in the western part of the State.

This is a philanthropic duty that the State owes to its citizens. A law should be passed exempting from taxation, for a period of eight years, artificial groves of timber. County commissioners should be empowered or required to offer a bounty of from $3 to $5 per acre, for the period of three years from planting, for all land planted to forest trees and properly cultivated, the distance of four feet to be required; providing, perhaps, that no person shall thus receive more than $100 in any single year?

The results of experiments, whether made by individual enterprise or governmental authority, have caused agriculture to be reduced to a science, and every subject of every civilized nation on earth to-day is blessed thereby. As a rule the government and State having the greatest amount of intelligence among the people are the ones that place the highest value on public experimental stations. More than twenty-five years ago sorghum was introduced, but with all the individual experiments the question of its manufacture into sugar, in a profitable manner, was not solved until the General Government took hold of the matter. Who will say that the experiments in regard to tame grasses of the Kansas Agricultural College grounds are not of incalculable advantage to our agriculturists? There can be no doubt in regard to the duty of Kansas to establish and liberally maintain one or more such stations, including forestry, that doubtful matters may be determined once for all, instead of leaving perhaps thousands of persons to try, as many times, the same experiment, entailing loss and in some cases ruin to individuals. No State or country, after once establishing and testing the utility of such stations, has ever abandoned them. Notwithstanding all the science and theories, we only know definitely by experiment. The professor may lecture learnedly about theories, but after all it remains to be tested by the crucible of accurate experiments. Not one agriculturist in a thousand ever demonstrated anything. They are usually guided by general results, failing to have sufficient scientific knowledge, capital, taste, or time, or other facilities, whereby, if they should attempt experimentation, they will fail in arriving at anything like accuracy. It will ever remain very largely the duty of the State to sustain such stations by liberal appropriations, placed in skilled hands, that demonstration may be clear and conclusive, and such knowledge disseminated freely to the people. The utility and necessity of such stations for Kansas is, axiom-like, self-evident. Twenty thousand square miles of western Kansas is purely experimental grounds. Rain is not the debatable question; we know it is insufficient for most agricultural purposes. The question to be solved is, What species of trees will grow and flourish there with the present rainfall? When this is demonstrated, and millions are made to believe in hedges and fruit trees, then, and not until then, may we look for such an increase of rainfall and humidity as will reward the labors of the husbandman. Nearly every nation of Europe has not only experimental stations, but forestry schools and forest management, under the direct control of the government. Large revenues are thus derived from the forests, and pupils are thoughtfully instructed in the art and science of forestry.

It is plain to my mind that, for the best interests of our people, and the rapid and certain development of the entire State, a central experimental station, with one or more sub-stations, including forestry, should at once be established by the State. Judging from the intelligence of the people, and the necessitous conditions, I say it will soon be done. The people will teach their representatives to thus regard their highest interests.

We have a fertile soil, and a sunshine and atmosphere that stimulate great physical and mental activity. Our domain is not limited to 80,000 square miles of surface, but includes the oceans of air and water over our heads and untold wealth beneath our feet. We must have a geological survey, to tell us of the wealth lying beneath the surface; and experimental stations and a system of reforesting adopted, that will enable us to advance intelligently and successfully in the future. We are truly a brave, active, intelligent and moral people. Kansas was first in grappling with and throttling human slavery. She was first in constitutionally subduing the liquor traffic, liberating its captives, and giving joy and thanksgiving to her dependents. By combining State and individual effort in the great works, we will very soon clothe the American desert with sylvan beauty, and dot it with orchards, gardens, and flowers.

HISTORY OF THE RUSSIAN MULBERRY.

BY I. HORNER, EMPORIA.

The hardy Mulberry, commonly styled *Russian* Mulberry, is a cross of several different varieties of Mulberry, the chief of which are the *Morus Alba*, *Mor*[illegible]*Tartarica*, and *Morus Niger*. It was introduced into south Russia by the Russian czar [illegible] a century ago, and was imposed upon the tree-planters by the Russian Government as the tree to be most important on the list of trees planted.

The *Tartarica* proper is famous for its fine quality of fruit, and is also regarded by some of the most successful German silk growers as possessing superior qualities as a silk-producer. The *Niger* proper is noted as a fine vigorous-growing timber tree. The *Alba* proper is noted more for its hardy qualities than for its merits as a tree—it naturally being a dwarf. Many authors, however, claim much merit for the *Alba* as a silk-producer. It certainly abounds in resin and original silk matter, though its foliage being so small, is very much against its being ranked as an important factor in the silk production; but its very hardy and silk-producing qualities render it a valuable factor in the cross of what now is known as the Russian Mulberry, as it will stand the rigor of extreme northern climate.

In 1875, the Germans who emigrated from south Russia and settled in different portions of the United States, chiefly in central Kansas, brought with them the seed of the Russian Mulberry, from which millions of Mulberry trees have been grown in the several States and Territories where they made settlements. The trees were planted by them quite extensively in Dakota and central Minnesota, and reports from those northern plantations establish the fact that the Russian Mulberry can be successfully grown even in the most northern portions of the United States, as none have as yet perished by winter-killing.

This Hardy Mulberry, as it should be called, can be vastly improved by a careful selection of seed from the more vigorous-growing trees—which also bear an abundance of fine fruit, and have large, valuable foliage. I have already demonstrated a vast improvement by growing from seed of developed fruit from trees that border largely on the *Tartarica* and *Niger* varieties, more than double growth being produced than by planting seed gathered promiscuously from hedges—which has been the general method of procuring the seed for the market by the German Mennonites. This method of gathering the seed should be discontinued, and as a result we shall have in the Russian Mulberry all that the tree-planter may wish as a vigorous-growing and finely-formed tree, and the objectional feature of "too dwarf" will be wholly obviated.

NOTES ON FORESTRY IN THE ARKANSAS VALLEY.

BY CHAS. H. LONGSTRETH,
Former Forester of the A. T. & S. F. Railroad, Lakin, Kansas.

At the beginning of experimental tree-planting in this valley, in 1873, we had every disadvantage to contend with. The country was new; Indians and buffaloes being the sole proprietors and settlers of the land up to that date. In the spring of 1873 civilized settlements began from Hutchinson westward. The first planting had to be made upon newly-turned prairie sod, and on what was then termed the "treeless plains." It was a question of grave doubt in the minds of many as to whether trees of any kind could grow in the valley; but a determination had been reached to make the experiment, and trees were planted at Hutchinson, Sterling, Ellinwood, Garfield, and Speareville. The results of these have far exceeded the most sanguine expectations in a successful direction. They have determined the question of the first and greatest importance, viz.: That trees, both forest and fruit, can be successfully grown, under intelligent management, on any of the lands in the valley. Second in importance, the question of adaptation and non-adaptation has been satisfactorily determined.

As to the varieties of trees used in these experimental stations, and among those succeeding the best, are found some of the most valuable species, for their wood, known in the Western States, such as Honey Locust, Black Walnut, Osage Orange, White Ash. These, with the Ash-leaved Maple, Catalpa (Western Hardy), Mulberry, Elm, Hackberry, and on the river bottoms Cottonwood and Willow, are recommended as a successful and preferred list. For evergreens, Red Cedar, Black Austrian and Scotch Pine are successful.

There are other species which may be planted with reasonable assurances of success, such as Ailantus, Kentucky Coffee Tree, Sycamore, Oaks, &c. The Chestnut and Hickory are a failure so far as tried. The list above named can be relied on as surely successful.

I will here name a few points essentially necessary, and which *must* govern the planter in his management to secure success.

First: The land must be well and deeply plowed, thoroughly pulverized, and put in as good condition as is required for a good crop of corn, before planted.

Second: Plant good yearling trees—older ones are objectionable—as they afford the best condition of root and top for transplanting. Besides they are much cheaper, the easiest to handle, and more likely to live. Of the Black Walnut, seed is preferable, and should be planted permanently in the rows where the future forest is to be grown, as the young trees are not successfully moved.

Third: Set the trees in rows four feet apart and from two to four feet in the row. I have experimented with various distances, and find that close planting is preferable, both for early and final benefits.

Fourth: Cultivation must be thorough during the first two or three years, keeping all weeds subdued and the land between the rows mellow and loose, and longer if necessary to give the trees sufficient growth to entirely shade the ground, after which they will require but little care. Cultivation should begin in early spring and continue not later than the middle of July each year. This will give the trees a chance to harden and mature their wood, which is essential to a prevention of winter injury.

FORESTRY NOTES AND OBSERVATIONS IN THE ARKANSAS VALLEY, IN OCTOBER, 1885.

BY THE SECRETARY.

The success of forest-tree planting in the Arkansas Valley is an assured success, if the methods for their management as set forth in the preceding notes of Mr. Longstreth are closely followed. At the railway experimental stations of the Atchison, Topeka & Santa Fé Railroad in the valley, and which were for several years under his management, may be found every encouragement for the tree-planter, from Hutchinson westward to at least the State line. An observation of these early efforts was given in the report of this Society, published in Vol. 12, Report for 1882; see page 173, under the head of "Forestry Notes along the Line of the Atchison, Topeka & Santa Fé Railroad, through the Arkansas Valley from Hutchinson to Speareville." In these notes, measurements taken by the author, of the different species found, were given, and their apparent adaptation to the localities, and prospective future development, fully stated.

A second observation, in October, 1885, fully confirmed the statements in the article above referred to. The growth has been quite rapid and healthy during the intervening years. It has equaled that of the same species in any other portion of the State. I very much question if another grove of Black Walnut can be found in the State which has made such rapid and erect growth or as straight bodies as are growing on the farm of Rev. J. B. Schlichter at Sterling, and very few that will excel in every feature—giving promise of a future forest tree—those found at the Ellinwood Grove; certainly not of the Honey Locust, at either Hutchinson, Sterling, or Ellinwood. At Sterling, a single Black Walnut tree, which in 1882 measured 14 inches in circumference and 15 feet in height, in 1885 measured 24 inches in circumference and 28 feet in height. The entire grove of several hundred trees shows a remarkable growth since its planting in 1875.

At Ellinwood station, a measurement of a Black Walnut in 1882 showed 11¾ inches in circumference and 16 feet in height; the same tree, in 1885, 23 inches in circumference and 24 feet in height. Honey Locust, in 1882, 14 inches in circumference and 24 feet in height; in 1885, 23¼ inches in circumference and 30 feet in height. These were from seed planted in 1873. The increased dimensions in other species were equally as great, considering their natural habits.

Nature has been outdone by these artificially-planted groves on those "treeless prairies." And why not? She casts the seed upon Mother Earth, and chances its growth with great odds against it. Its risks of even a germination are great, and still greater are the risks for the tender plant which springs from it. Destructive elements surround it, and its chances for success in the struggle for life are as one to a thousand. Such are not the hazards of seed sown by man, and reared by his intelligent hand. If the forestry efforts of man met with such waste as follows every effort of nature, there would be but little hope for a reforestation of any portion of this continent by any artificial process.

Forest-tree planting has been annually extended westward, until now we find plantations as far out as Garden City and Lakin. As the settler pushed on towards our western boundary, trees have followed. Tree-planting is now within about forty miles of our western State limit, and in a short time trees will be growing as a border between Kansas and Colorado—line trees between the two States. Three years ago the forestry-men of Colorado proclaimed that they would meet Kansas forest-tree planting at the respective State lines. Present prospects indicate that Kansas forestry-men will soon be there, and stand alone, or push on through the valley into our sister State. At Lakin have been planted Catalpa (Western Hardy), Russian Mulberry, White Maple, and Cottonwood, which are doing well.

The immense population settling in those western counties will not rest content with the open prairie. Those home-seekers, like the early settlers in eastern Kansas, will have trees around them, fully recognizing their great value to agricultural interests and their blessings to man. Homes would not be homes without them, and in the near future every farm will have its groves, shelters, and wind-breaks, and the homes the blessings and beauties of shade and ornament.

AN EXTRAORDINARY NOTE—A HORTICULTURAL "FACT" DISCOVERED IN 1885.

At Garden City, for the first time in a forty-years experience in the culture of trees and thirty years of the time with the Osage Orange, I learned from a Government official serving Uncle Sam in a branch of the General Land Office, that "the Osage Orange was not a *forest* tree, but simply a *hedge-plant!*"—conclusive argument (?). "Had never known it to be used for any other purpose."

As an individual opinion, such a declaration would fall harmless, and be treated as the statement of an impractical man; but as the decision of an official clothed with power to control, and in a measure direct the forestry efforts in that portion of our State, it is most unjust, because not founded in fact; and its promulgation inflicts great injury upon one of the most important industries of our State as related to success on our Western prairies; and in the near future the *curse* of such folly or ignorance will be most keenly felt by the settlers in the counties embraced in that land district.

Thus a life's devotion to the promotion of the forestry interest, and its economic features especially, by such intelligently practical men as Warder, Kennicott, Douglas, Overman, and a host of others of the West, and Sargent of the East, and the experience of practical men in our State, who have unselfishly sought to give character and value to the general effort, and a success to our State forestry, is set at naught by the folly or ignorance of one man. "It would not make a tree — was only a bush;" and yet on the following day, and within the jurisdiction of this official, I measured Osage Orange trees — yes, *trees* — only five years old, apparently, which were found to be 9 to 10 inches in circumference and 15 to 20 feet in height, having a straight and smooth body, vigorous and healthy, with a current year's central stem-growth of from 6 to 7 feet length, and planted on upland prairie. Show me any species of trees which this arm of the General Land Office would admit as in compliance with the law, which could excel this growth, or would afford greater promise of a nice and valuable future tree, excelled by none in its durability or strength, or its value for fuel, and adapted to upland planting.

Says Prof. C. S. Sargent: "The Osage Orange, in addition to its well-known value as a hedge plant, is a forest tree of great economic value."

Dr. John A. Warder: "The Osage Orange has long been grown in immense numbers for the purpose of hedging; but it has also been introduced into our timber plantations. Already the firmness, beauty and durability of its wood are appreciated, and its value will cause it to be as largely planted for economic purposes as it has been for agricultural use as a fencing material."

Prof. E. Gale, President of the Kansas State Horticultural Society, says: "The Osage Orange tree has all the essential conditions for general cultivation upon the Plains. It is easily raised from seed; transplants well; endures our variable climate; and by its spines protects itself against stock. Unlike the Oak and Black Walnut, even its smallest branches are almost indestructible; hence the smallest poles answer many purposes about the farm and garden, while the bodies of the trees in a few years become valuable for posts and fencing."

By Prof. E. A. Popenoe, Kansas Agricultural College: "It is certainly opposed to the true spirit of the timber-culture act, to put a premium upon the planting of comparatively valueless trees, as the Cottonwood, White Maple, and Ash-leaved Maple, and debar the use of the Catalpa, Ailantus, and Osage Orange."

By Hon. M. Allen, Hays City: "With the Catalpa, Ailantus and Osage Orange stricken from the list, I feel that fully one-third of our resources in sylvaculture on the 99th meridian of west longitude is gone, and this the very region where the greatest work in that line is to be done — where it is most imperatively demanded."

The growing of forest trees in western Kansas is an immediate necessity with the settlers, and such species as can be the most easily grown and with the least cost will soonest meet their wants. The matter of choosing is not altogether theirs. It is not what species they may wish, but those which can be successfully grown, which controls them. I do not believe it was the intent of the framers of the timber-culture act of Congress to place such embarrassments upon the planters as the decision of the officer in the Sterling Land District imposes, nor is it wise in the Government to permit impractical men to place such arbitrary restrictions upon its operations.

Species adapted to the northern or any other portion of the United States may not be suited to a general planting. Even is this the case in our own State; some species adapted to the conditions of the eastern counties do not succeed in even the central counties. Therefore a liberal policy, based upon local adaptation, should be conceded by the General Land Office, as by it the highest interests of forestry, and thereby that of the people, will be best conserved.

PROGRESS IN WESTERN KANSAS.

BY DR. W. M. GOODWIN, LA CROSSE.

It would be very difficult to find a man or a woman who does not admire trees in a forest or on the lawn, and they are noticed much more in a treeless country, because of their beauty, and the break they afford to the monotony of the general landscape. Some persons admire trees only from an economic point or money value, and such endeavor to grow them with the least possible outlay in money or labor. Others regard them from an æsthetic point as well as for their money value, and are more successful with their growth.

"Experience is a dear school," some writer has said, and many will not be taught in any other way; and if any doubt the truth of this saying, a few days' travel and observation in southwestern Kansas will certainly convince the most skeptical. Yet it is wonderful how rapidly our people are learning from experience what kinds of trees are successful, how and when to plant and cultivate them to keep up a thrifty condition.

Where we find a timber grove planted on well-prepared land, and suitably cultivated, we see a reasonable success with Cottonwood, Black and Honey Locust, and Black Walnut, and very few now doubt that these, with the Hackberry and Russian Mulberry, will succeed all over western Kansas.

The failure of one man in a community, who appears to have used extraordinary means in planting, will sometimes become a discouragement to a whole neighborhood, especially where not one in fifty has had the least experience with trees, and such is the character of most of the men who in years past have attempted to tree up our western plains, and in this failure the cause was largely due to the lack of a knowledge of how to do it. To illustrate: I saw one claim where fifty holes were dug in the prairie sod, about two feet deep and from four to five feet in diameter, in the fall. These were left open all winter. In the spring a little coarse manure was placed in the bottom, and trees set in them, with the roots at least eighteen inches deep. These trees must have been six or eight years old, and looked more like large branches cut from old, decaying trees. They never leaved out, and his neighbors seemed surprised that such extra care did not succeed, and concluded that the climate was at fault, and that trees could not be grown in southwestern Kansas. Most of the failures have resulted from just such unreasonable treatment.

There have been a few men in each township who have been successful in planting and growing trees, both forest and fruit; and from these, many others are learning. Their success has proven beyond a doubt that trees can be grown, and will do well whenever judiciously managed. Thousands of Locust, Russian Mulberry and Black Walnut will be planted during the spring of 1886, where failures have occurred in the years past, and a confidence in success now prevails with our people to a greater extent than did a lack of it at the early periods of settlement on these plains. In a few years more the prairies of southwestern Kansas will be dotted all over with groves of forest trees and orchards of fruit; and furthermore, I believe that in a brief period more we will be successful in growing some of the other valuable kinds, which have been discarded simply from the lack of having been properly treated.

Thus are we progressing with forestry. The advances made have been at great expense and a *persistent* effort, backed by indomitable perseverance and will.

LESSONS TAUGHT BY THE FOREST-TREE PLANTATIONS AT WILSON.

BY F. J. SWEHLA, WILSON.

As early as 1871, the Kansas Pacific Railway Company had planted an experimental garden at this place. It consisted of Honey Locust, Black Locust, White Maple, Ash-leaved Maple, Green Ash, Black Walnut, Ailantus, Catalpa, Osage Orange, and a few other varieties. All were grown from the seed, and they made a good stand. The trees all grew well for five or six years. But they stood crowded in the rows, as they came up thick from the seed, and the rows were only four feet apart. So the company put the garden into the charge of an "old forester," to change the whole tract of land (about eleven acres) into a park. The forester had trees dug up; roots and branches heavily pruned; transplanted into open spaces where no trees stood; setting them far apart; and only such were left to remain as stood in rows agreeably to the new plan of the future park. The labor lavished upon the transplanting (cutting and slashing business) was *enough* to give a start to a dozen successful parks. But this remodeling proved a disastrous failure. Only few varieties survived, and those only that stood fortunately where this model forester thought they should be. And to-day this whole tract is burned off like so much prairie, with a few scattering Honey Locust, Black Locust, Ash, and Osage Orange, here and there a Walnut tree, standing silent but reliable witnesses to the sad work of destruction.

When I first came here, in 1874, that experimental ground was a thrifty, dense young grove, and it filled me with confidence in the growth of all kinds of trees. Now its condition must be anything else than encouraging to a new-comer. But it teaches a lesson worthy of study, and to be heeded by every tree-planter.

The individual enterprises in tree culture were many, and were mainly induced by the Government's liberal offer in the timber-culture act. Their successes are varied —from a few successful to a total failure.

CARE AND PREPARATION OF SEEDS AND CUTTINGS.

BY PROF. E. GALE, PRESIDENT OF THE SOCIETY, AND OTHERS.

One of the first questions that forces itself upon the beginner in forest culture is, "How can I use successfully the material that nature places at my disposal?" Forestry, with the great mass of people who locate on the Plains, is a new occupation. We have seen the trees of the forest bloom and ripen their seeds from childhood to manhood, without giving scarcely a thought to the special conditions essential to the completion of the round of reproduction.

Seeds were simply seeds, affording us no interest, whether ripened in May or October. The botanist, even, seldom sees it a matter of moment to note the ripening-time of the seeds, and much less does it come within the range of his work to deal with the mode of treating the seeds for reproduction. Hence, when we come to a home where forest culture must take a prominent place, we find ourselves in the very elementary principles of forestry sadly wanting. We see all along our creeks and rivers, trees producing seeds, and we ask, Why may we not make these native seeds grow into forests? True economy dictates that we should use in our first essays at forestry that range of varieties which are found growing along our own creeks and rivers. When we go beyond this, let it be with caution, and more in the way of experiment than extensive planting.

The seeds of our forest trees in most cases require special treatment. No rule will apply to them all. Even the seeds belonging to the same genus sometimes require different treatment; and sometimes the same variety will succeed almost equally well when submitted to distinct modes of treatment. My object at this time is simply to submit only a few elementary facts, of practical application to the beginner in forestry. In doing this, I shall seek only to call attention to those species of trees that should first interest the planters on the Plains. The beginners want nurse trees; for these we should look first to the rivers and creeks for our supply. In looking over the material from which our supply must come, we find some

SEEDS THAT MATURE IN THE EARLY SPRING.

These embrace the Elms, Willows, Cottonwood, and the White and Red Maple; the latter, however, not a native of the State. The seeds are all mucilaginous in their composition, and require to be planted very soon after they mature. While they may be transported considerable distances, care must be taken that they do not become dry and brittle; or, on the other hand, become too warm by close or long confinement in large packages. The maple seed can be planted like corn, in drills, and will need no special treatment but to keep the ground clean of weeds. The seeds of the Elm, Willow and Cottonwood, being quite small, must be covered very slightly, and the surface of the soil must be kept constantly moist until they germinate. A partial shading and daily watering of the ground for a few days, in our climate, it often quite essential to insure success.

Next in the order of time is the

RED MULBERRY.

This tree grows abundantly in our river and creek bottoms. The seed matures in early June. The berries should be carefully crushed, and the seed washed from the pulp. This seed can be planted immediately, or dried carefully in the shade and planted the following spring. The first course is the most desirable, as the seed, with proper treatment, is sure to germinate, and we gain one year in time. As the seed is small, the soil should be sifted upon it very lightly, and the seed-bed made so as to be partially shaded. As this tree has a very lengthy tap-root, the seedlings should be transplanted when one year old.

Next in order of ripening its seed is the

LINDEN, OR BASSWOOD.

This tree, though not as valuable as many others, yet as a native of our State it has some claims upon the notice of the tree-planter. The seed matures with us in early August, and should be gathered from the tree as soon as it begins to turn yellow, and should be mingled carefully with moist sand and kept until the following spring, when it should be planted in the seed-bed very early. As the seed comes up almost immediately, the young plants will be in danger of suffering in our climate from late frosts.

We come now to the

SEEDS THAT MATURE IN AUTUMN.

These seeds we will divide into classes, having reference to the treatment which they should receive.

The first class embraces those seeds which should be either planted immediately, or kept in moist sand or otherwise until spring, *i. e.*, the Hickories, including the Pecan, Chestnuts, Oaks; the Maples that ripen in the fall, including Ash-leaved Maple (Box Elder); all the Ash genus, if we except Green Ash, the seed of which will germinate if kept dry until spring, but which may be treated like the others named; also the Persimmon. This class will also include the Butternut and the Black Walnut. Of this class, it is desirable to plant the seeds of the Hickories, the Oaks, the Butternut and Black Walnut where the trees are to grow, as they do not transplant well. If it is not convenient to plant the Hickories, the Oaks and the Black Walnut in the fall, they can be spread thinly on the ground and covered with sod or light litter until early spring. The Chestnuts, the Ash genus and the Maples, except the White, can be conveniently mingled with sand or thoroughly-decayed sawdust, very slightly moistened, and thus preserved until spring, either in the cellar or covered with earth in the garden, where they will be free from standing water.

The second class of fall-ripened seeds includes those which may be preserved in a dry condition until spring, and that then require only ordinary treatment for their growth. I name as worthy of trial here the Ailantus (only on high, dry ground), Catalpa, and Red-bud.

The third class includes the seeds which can be kept in a dry condition during the winter, but usually requiring some special treatment for successful germination, if so kept. Dogwood will not germinate for two or three years, unless cleared from its pulp and put into moist earth in the fall. The Kentucky Coffee Tree seed and that of the Honey Locust require thorough scalding before planting in the spring. With this precaution, there is really very little difficulty in securing an early germination. The Red Cedar is the only evergreen that I shall name in this connection. The seed of this tree will seldom germinate until the second year. In our climate, some slight protection will be required for the first year in the seed-bed. In Kansas, the Red Cedar makes a much more rapid growth than in the East, and for the sake of protection is no doubt worthy of cultivation.

IT SHOULD BE REMARKED

That this report has been prepared specially for Kansas planters, and for very good reasons does not include many of our old friends of the East; and as it is designed for practical use among the farmers of Kansas, it may exclude some which a nurseryman would be inclined to test.

NOTE.—To the above should be added the Osage Orange, belonging to the second class, viz.: those which ripen in the fall, and may be kept until spring in a dry state. This seed should be soaked in water for several days, and until signs of sprouting are discovered, then planted. If the water is kept in a tepid state their germination will be hastened. Their planting should be made at about the season for that of corn: after the ground becomes warm.

PROPAGATION BY CUTTINGS, AND THEIR PREPARATION.

Cuttings of all classes should be made from vigorous and well-matured wood of the current year's growth, in late autumn after the leaves have fallen, and before any severe freezing—as sometimes the vitality is injured during winter. They should be made from eight to ten inches in length, tied in bundles, and buried with butt end down in the earth, and in a half-upright incline, and sufficiently covered to keep them from drying out. In early spring, plant in deep and well-prepared ground, and either in nursery or forest rows. Another method is to plant the bundles inverted, top down and butt end up, in a trench, covering them sufficiently deep to keep the butt ends moist, which, with the warming of early spring's sun, will cause a callous to form on the butt end, from which the first roots start; then reverse, and plant as in the first method recommended. The Cottonwood, Willow, Ailantus, Catalpa, native and Russian Mulberry may be easily propagated in this manner.

Of the Catalpa seed, John C. Teas, of Carthage, Missouri, who has had extensive experience, says:

"The seed is very light and thin, and does not require soaking, freezing, or other previous preparation, as most tree seeds do. The best time to plant is after the ground has become somewhat warmed by the sun, and spring frosts are mostly past—say in April or May. The ground should be made mellow and smooth by plowing and harrowing, and laid off in drills about an inch deep and three and one-half or four feet apart, unless it is a small lot to be worked by hand, where the rows may be about two feet apart; but in larger lots, most of the work can be done with a horse and cultivator. The rows should be laid off *straight*, by a line, both for appearance and for convenience in cultivation. The drills may be made with a corn marker, laying off two or three rows at once. For a small patch, the corner of a hoe answers very well.

"Choose a still day for planting, or if obliged to plant in windy weather, the seeds must be wet, or they will blow away before you can get them covered. After wetting, we sift dry dirt among them, to prevent their sticking together. The seeds may be strewn along pretty thick in the drills, and carefully covered with fine dirt, scarcely an inch deep. In light or sandy soil, they will of course bear to be covered deeper than in heavy clay. A dozen little trees coming through the ground together, can by their united strength heave up and break the crust, where one or two would fail to get through, and thus perish. If they come up too thick, they may be thinned and transplanted in a damp time as readily as young cabbage plants."

The growing of forest trees from seed is most successful and attended with less labor when planted and cultivated the first year in nursery form, excepting such species as do not easily transplant, which are mentioned above.—SECRETARY.

CULTURE OF THE BLACK WALNUT.

BY S. W. VEATCH, WASHINGTON.

Few persons who have not been on the plains of Kansas and Colorado are aware of the value of a grove of timber, even though not large enough for use. If trees of the most valuable kinds are planted, a few years' growth will bring more money than if the same land had been cultivated to farm crops. The Black Walnut is now the most valuable timber, and the probabilities are that it will be more valuable in a few years. The vast forests of this species are nearly exhausted, and but little remains that is suitable for furniture-making.

In planting the Walnut, choose level second bottom or upland. The ground should be thoroughly worked, then laid off in rows eight feet apart. To insure better success, I would advise plowing deep furrows, the same as if listing for corn. In these place the seed, six or eight feet apart.

They should be cultivated at least twice a year, throwing a little soil into the furrows at each plowing. The furrows will catch all snow and rain, and the loose soil plowed in will absorb nearly all the moisture. You should manage to have the furrows level when the trees are too large to be cultivated.

I also recommend the planting of other trees in the same manner as described above. I would choose the following list of varieties as adapted to soil and climate, and to be preferred in the order named for this county: Ash-leaved Maple, Black Locust, Green Ash, Honey Locust, Catalpa, White Elm, Cottonwood, Red Elm, Osage Orange. Would prefer the autumn season for planting both seeds and young trees.

The area of forest-tree plantations has been extended very rapidly in the last few years. Shelter-belts have been an advantage to orchards, gardens and field crops, in the protection which is afforded from high winds, and tempering extremes of heat and cold.

WIND-BREAKS.

BY MAJOR Z. S. RAGAN, INDEPENDENCE, MO.

Dr. John A. Warder, who spent a long and useful life, devoted mainly to horticulture, left a legacy in his inestimable work, "American Pomology," a lasting blessing to present to future generations. However, in the after-part of his life, he did much to aid and promote forestry in the United States. Let us also emulate and encourage tree-growing, to advance the best interests of our commonwealth.

The subject assigned for this article is one of great importance in many particulars. Many instances might be enumerated where growing timber, even for fuel, has been very remunerative; yet at this time, we forbear to enter into detailed statistics of the value, even in a commercial way. Timber plantations of the present day will be more needed in the near future, to counteract the disastrous effects sure to follow the present rapid and wanton destruction of our natural forests, thereby exposing both man and beast to the vigorous, chilly blast from the northwest and the hot winds from the southwest, and to supply the already extensive and increasing demand for lumber and timbers for construction. It is not from the fact that the Kansas State Horticultural Society has not been ably represented upon this subject, that we have chosen and consented to add something supplemental, by way of amendment, to what has been advanced upon the subject of forestry, but to keep this subject before the people, by adding the ornamental to the useful.

Wind-breaks may be made by planting belts or groves of either deciduous or evergreen trees, or a union of both kinds. Our native forests teach that an intermixture of different kinds succeeds better, as they are generally composed of varieties. Yet for wind-breaks evergreens are the most desirable, from the fact that their dense foliage holds during the entire year, and breaks and modifies the wintry winds and summer storms. Their foliage falls beneath the trees, and is not carried off by winds, but furnishes good mulch for the roots, as well as good bedding for the stock, while the succession of branches and foliage above ward off wind, snow and rain. Such shelter is preferable to open sheds for stocks, or even inclosed barns, especially where stock is crowded and surfeited with confined breath and perspiration, so that when turned out for water, or exercise, the change is so great as to chill and subject them to contract colds and disease, while those resting beneath the trees, having breathed pure air, which is bracing and healthful, come forth for feed and water without feeling any ill effects from the change. Thus we conclude that it is cheaper and better to grow wind-breaks than build sheds, barns and stalls, and less labor to feed, and to let the cattle seek shelter in the grove, than to stall and groom. Only a few years ago I had a neighbor who had a fine flock of sheep, who, during a deep, protracted snow, confined a portion of the flock in a tight barn, and when the weather became warm they came out badly diseased, shed their wool before shearing, and were almost worthless; while those that were left out to take their chances among the cattle, and were fed in an open field with a woodland to lie in, came out fat and fine and were ready for the early market. Had all these sheep been housed alike, probably it would not have been ascertained what caused the malady. Another argument in favor of the wind-break is, it is becoming more and more valuable each year, while the sheds and barns are fast decaying and needing repairs.

We should not lose sight of the protection of our dwellings, orchards, etc. In the absence of wind-breaks our feathered songsters will be compelled to seek shelter in more favorable localities, while in our wind-breaks they may remain and hibernate, and with the dawn of day wake the family with their merry songs, and in the early spring mornings sally forth to catch the miller and early worms, that infest our orchards, gardens and fields. There are said to be more species of birds in Central Park, New York, than any area of its size in the world. I believe it contains twenty-seven hundred acres. Its beauty, inviting lawns, fountains and lakes, belts and dense clumps of trees and shrubbery (wind-breaks if you please), and protection from the huntsman, make a home in which they dwell in safety. By way of example or illustration: If a rural neighborhood or extended district would employ a competent, practical landscape gardener to lay out and plat the surroundings of each and every home, permanent improvements might be made more cheaply and satisfactorily. Our Government has already undertaken to foster forestry and fish-raising by artificial ponds, etc., etc., and must soon pay attention to ornithology, by having reports from different districts, as to what birds are useful and which are not. Large bodies are said to move slowly, and through Government agents not much can be expected without the aid and coöperation of horticultural and agricultural societies, to originate, agitate and bring their influence to bear in any important undertaking for the public good. Bear in mind that wind-breaks not only destroy the monotony of the country, but add a charm and loveliness to the landscape, and are the embellishing touch.

In conclusion, we would recommend, yea, urge tree-planting along the public highways, around the school-houses, churches and public buildings. Plant trees around the dwellings and on the lawns. At any rate, don't forget to plant trees for wind-breaks and ornament. Plant on the hill-tops and in the valleys, on the prairies and on the plains.

THE FARLINGTON FORESTS.

BY THE SECRETARY.

These noted forests are located in the north-central township of Crawford county, within a few rods of the Kansas City, Fort Scott & Gulf Railway station at Farlington; hence they derive their name, "Farlington Forests." They are about twenty miles south of Fort Scott, and cover a section of prairie — 640 acres — located in a large and exposed region, having at the time it was planted no shelter or protection from the force of winds, conditions common to all prairie countries. The topography of this section is thus: With the greatest altitude at the extreme northwest corner, it gently descends to the south and southeast and east, broken about midway by a shallow ravine running from northwest to southeast, which affords an ample drain to the entire tract, and has its main outlet and lowest surface on the eastern side near the southeast corner. The view from the section-house at the southeast corner commands the entire tract — a grand landscape, adorned with masses of the most luxuriant growth of rich foliage and compact blocks of strong, vigorous trees.

These extensive artificial forests were planted by that eminently distinguished forest-tree grower, Robert Douglas, of Waukegan, Ill., whose extensive intelligence and successful work in promoting the forestry interests of the United States have won for him a national reputation, and enrolled his name with that of the late John A. Warder, of Ohio, Bryant and Edwards, of Illinois, and many others throughout the States.

Planting began in the autumn of 1879, and continued through three succeeding years to completion. Of the methods used in preparing the land, the planting, and after-treatment, I will give Mr. Douglas's report furnished this office:

"It was the impression when we commenced this plantation, that the prairie should be broken one season, and a farm crop grown on it the next, to bring the land into a proper condition for the trees; but

> experience soon taught us to adopt the following methods, viz.: Break up the prairie when the grass is in its thriftiest growth, which is from the 20th of May till late in June, in southeastern Kansas. Late in August and September of same season plow it lengthways of the sod furrow, and sufficiently deep to reverse the sod, bury the weeds, and to cover the entire surface with a few inches of mellow earth. This leaves the land in a fine condition for spring planting, especially if a harrow and roller are passed over it before laid off into rows. The land, after preparation, was marked into rows four feet apart each way, and the trees planted at the crosses of these markings.
>
> "Strong one-year-old trees are preferred for such plantations, and should be 'run under' with a tree-digger in early spring, and while the teams are preparing the land, the workmen can be pulling the trees and tying them in bunches of one hundred each. The workmen are then divided into groups of three — two with spades, and one to hold the tree in place; usually a boy is employed for this last work. The two men with spades plant on adjoining rows, with the tree-holder standing between them. The planter strikes his spade vertically in the ground on the running line, close up to the cross-mark, and then on this mark close up to the cross-line, thus giving two perpendicular sides terminating in a corner thus, ┌─; a spadeful of dirt is raised therefrom, and the tree set in this corner is covered with the contents of the spade, and as the planter steps forward he places his foot firmly on the dirt, close up to the collar of the tree, and moves on to the next cross-section to plant another. The holder, having a bundle of trees on his left arm, is kept quite busy attending to the two planters. After a little experience he will learn to bring the trees out of the bundle with a circular upward motion that will spread out the roots when placed in the ground as evenly as they could be with the hand. The three persons will plant on an average 4,500 trees in a day of ten hours.
>
> "When we consider that by this method every tree is planted in a straight line, at the proper depth, the roots spread out, and the earth firmly packed around them, it will be seen that it is much better than any other method. This is known as the Douglas three-motion system, but as it is not patented, any one is welcome to use it.
>
> "We employed from thirty to sixty men in planting, and soon found that we could expedite the work by having a man to serve out the bundles to those holding them for the planters. He would follow in the rear, and whenever he discovered a boy with less than a dozen trees left from his bundle, he would furnish him with another bundle, which he would carry under his left arm ready for use. Cultivation was done with a two-horse walking cultivator, working the ground both to and from the rows, as thought best. We used no hoes, as careless, awkward workmen will injure many trees with such an implement. If the land between the rows is kept well cultivated, the few weeds escaping the cultivator can be easily pulled out and destroyed."

Mr. Douglas further says:

> "My main object in making this contract was to secure an opportunity to establish a system that might become a guide to future new beginners, who must necessarily be somewhat confused as to forest-tree planting by the numerous recommendations found every year in our public journals, for hardly two writers agree, and those who write the most generally have the least experience."

I found the Farlington Forests a complete practical demonstration of the possibility of growing artificially-planted forests on the broad open prairies of Kansas. They have also proven that such can be made profitable, for at the rate of wood-growth found in these forests, the near future will yield a paying product. Trees are found in this plantation of only six years' growth, which measure eight inches in diameter, and which in another period of same length certainly will double; and estimating on this basis, we can easily calculate the marketable value of this immense area, which contains to-day over one million and a half of vigorously-growing trees, at a cost, Mr. Douglas says, of only one and a half cents per tree. Allowing that the cost of the next six years will equal that of the past — which is not at all probable — we have a total cost of three cents per tree, with a dimension of one foot or more in diameter, and a corresponding height. It is true this plantation is composed *very largely* of the Western Hardy Catalpa, (a small portion having been planted to the Ailantus,) which possesses remarkable vigor and a rapid growth. Perhaps no other species would have given such astonishing results in a growth so evenly developed, and so few failures in the rows. But all of this is in its favor, and with the valuable character of its wood should add greatly to the confidence of planters of forest trees in its preference. The Ailantus trees grown in this forest have done remarkably well; are healthy and vigorous, and shapening in promising forms for a future valuable timber. This species is conceded to be well adapted to high, thin soils and stony or shaly breaks of our prairies into ravines. On such localities its wood becomes of a most durable character. These points seem to have been well understood by the planter of the Farlington Forests, as wherever such character of land occurs, it is covered with thrifty growing blocks of Ailantus trees, among which there have evidently been but a few failures in the original planting.

Mr. Douglas has accomplished a remarkable success in this undertaking. The lesson it teaches is of inestimable value to our people and State. The evidence found in the results of this work affords every encouragement for like undertakings in the future. Undoubtedly the grand success of this effort will be the commencement of a new era in forest-tree planting upon our Western prairies, and cause the investment of large amounts of capital in this industry. The value of native timber-lands has for years been fully recognized; but the question of success and profits of an artificial plantation has not been clearly established, therefore has been a hindrance to extensive investments. The question of a successful growth is no longer a matter in doubt; and there only remains for determination, not whether it can be made profitable, but what will be the extent of profit when compared with other industries. In looking over the Farlington Forests, no one will hesitate to admit that there already exists a paying profit on the capital there invested, and that the prospective profit is very great.

Not only does the result of the experiment in this plantation reflect great credit on Mr. Douglas for his sound judgment and ability as a forest-tree grower, but also to the Kansas City, Ft. Scott & Gulf Railway Company, and especially to its General Manager, Geo. H. Nettleton (whose interest in the effort led to the contracting with Mr. Douglas for these forests), for the investment of needed capital to bring them to their present successful condition, is due the grateful acknowledgments of the forestry people of the great West. The important question, "Will it pay to plant extensive areas of our prairie land to forest trees?" is fully and affirmatively answered by the Farlington Forests. Furthermore, this effort has determined an economic and reliable system for the planting of large tracts of lands to forest trees and their proper and safe management — at a great expense to the company, it is true, but which is freely given to the public.

MEASUREMENTS IN DIAMETER AND HEIGHT.

The blocks of three and four-year-old trees — Catalpa (Western Hardy) — planted and adjoining the section-house on the north and west, were carefully examined and measured. These ranged from two to three inches in diameter and from 7 to 12 feet in height. Many showed a current central growth of 5 to 7 feet in length. The smooth bark and strong, vigorous growth indicated every desired evidence of health and satisfactory adaptation to climate and soil. The blocks of five and six-year-old trees, planted to the westward and north, were exceedingly healthy and well-grown, bodies straight and well-shapen to form a valuable tree in the near future. These were equally vigorous and healthy with those of the first blocks named. In measurement they would range from 4 to 7 inches in diameter, and from 15 to 22 feet in height.

The Ailantus (glandulosa) were mainly planted on the thin, shaly land and along the skirts of the ravines. Their growth has been vigorous and healthy, bodies straight and well-formed. Many of those six years old measured from five to six inches in diameter, and at least twenty feet in height. Those of younger age were equally well formed and vigorous. The tendency of this species to send up sprouts from its surface roots, when planted in open places, does not appear on these grounds where so thickly planted. A very few sprouts were noticed on the outskirts of some of the blocks.

When we consider the large extent of this forest, the unusual evenness in the growth of the blocks of different ages, and the evidently very few failures in the number of trees originally planted, their uniformly remarkable healthy and vigorous growth, we must concede it to be a marvelous success, and a surprise to Mr. Douglas, who planted and took care of it to its present age.

As to the future management, I will here follow with an extract from Mr. Douglas's own statement, which is worthy of careful study by every planter of forests:

> "As forestry in this country is yet in its infancy, and nearly everyone who has given it but a passing thought has a theory of his own, and looks more to present appearances than to ultimate results, and as one or more of these theorists has recommended the pruning of these trees, I would here urgently caution everyone against being led into this great mistake and very expensive experiment. They were planted closely, to avoid the necessity of pruning. The trees will prune each other; even the six-year-old trees are now twenty feet high, and have their side branches already smothered and dead up to over one-half their height, so that it would be a great waste of time, if nothing worse, to prune them the first ten feet from the ground, and it must be apparent to anyone that it would be very costly to prune them up the next ten feet, but in three more years the next ten feet will be pruned by the same process as the first. The living side branches are a great advantage to the trees, support the trunk, fill up and shade the spaces between the trees, shading out the weeds, and retaining the moisture. The branches already dead, *and they are the only ones that could be removed without actual damage to the trees*, would cost as much for pruning and removing as the full cost of furnishing the trees, planting, and cultivating them to the present time, viz., one and one-half cents per tree. These dead branches will fall off gradually, so that when the trees are sixty feet high they will show a trunk of 40 feet without a limb, and, as may be seen in the native forest, the branches will have decayed gradually and assisted in furnishing nutriment for the living trees. It is true that, to an ordinary observer looking in among these trees, the dead lower branches will have a ragged appearance, and aside from these there are misshapen and crooked trees; but even these are better left standing than if removed, as they afford shade for the trunks of adjoining trees.
>
> "The plantation is a surprising success. It is on a larger scale than any other in the country, (unless it be the one nearly adjoining, that we have recently planted for Mr. H. H. Hunnewell,) and I would urgently recommend that the trees be allowed to stand undisturbed—except to remove the branches that reach out into the forest roads—till the first planting is at least ten or twelve years old; but in the meantime, if fence posts be required within that time, they can be thinned out as wanted, without damage to the plantation.
>
> "In closing, I desire to express my high esteem for my warm and personal friend, Prof. C. S. Sargent, Director of the Arnold Arboretum, at Brookline, Mass., through whose influence and directions these forests were planted."

DURABILITY OF FOREST TREES.

BY J. W. BYRAM, CEDAR POINT, CHASE COUNTY.

Twelve years ago I fenced a quarter-section of land located in the Cottonwood valley at this place, and was compelled to use such material as was at my command. For posts, I had Black Walnut, Honey Locust, Native Mulberry, Kentucky Coffee Tree, Red Elm, both split and in the round; Hackberry, split; White Elm and Green Ash in the round. For rails, and poles used as rails, all of the foregoing species, and Cottonwood and Willow. Now the results of the different species. The round or unsplit Black Walnut and Red Elm *posts* failed first, lasting only one season, but those which were split lasted from three to five years, but all rotted off at the ground; Hackberry on the second and third year; Honey Locust, round, became so badly worm-eaten that they broke off the first year; split posts of good size had only their sap-wood eaten, while the smaller ones were eaten even in the heart-wood, and began to fail on the third year; the larger ones lasted until the fence was moved ten years after set, but were not worth a second setting. White Elm: The small round posts began to fail on the third year, but the larger round ones lasted ten years, with still a small portion in the center, yet sound and tough as leather. Some of the larger ones were reset, and are yet in good condition, being now twelve years in the ground. Green Ash: The small round posts, size of a man's arm, began to fail and break off at the ground on the sixth year, and at the end of the tenth year none were in condition to reset. None of these were as large as

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those of White Elm, or they would probably have endured as long, and perhaps longer. Kentucky Coffee Tree: All these lasted through the ten years, but the small round ones were not fit for resetting, while the large round and split ones showed very little decay, and are in good condition for service yet. Mulberry proved to be the most durable wood of any in the lot. Some of the round are still in use, and all the split ones were reset, and show but little appearance of decay. Black Walnut: Split posts lasted the ten years, with the exception of those made from young timber, which failed and broke down at the end of five years. Some of the larger ones, when not long enough to reset by reversing ends, were sent to the wood-pile, making excellent firewood. I have not been able to discover any difference in the durability of those set with butt end or top end in the ground.

The trees from which the entire lot of posts were made were cut in January and February. Bean poles of the Kentucky Coffee Tree set in spring and taken up and piled away in the fall, are sound and show no visible marks of decay after a use of twelve years. Much of this lot of timber is still in use in the construction of sheds, corrals and pens.

CONCLUSION.

It is my judgment that for a timber for all purposes, among those above named the native Mulberry stands first, followed closely by the Kentucky Coffee Tree and Ash. For uses above ground, none excel the Red Elm and Willow. Probably the Honey Locust, if cut in midsummer, would have been entitled to a front rank, as its main cause of failure resulted from the depredations of worms. For a valuable tree in its old age, the Black Walnut is entitled to the highest consideration, but not while young.

For groves and timber lots which are to be set and grown as thickly as the timber-culture act requires, and from which the planters can obtain poles, etc., by thinning, for many purposes on a farm the most valuable list would be the following, and preferred in the order named: 1. Catalpa (Western Hardy); 2. Native Mulberry; 3. Green Ash; 4. Kentucky Coffee Tree; 5. Red Elm. To these should be added in every third or fourth row the kinds which require age to make them most valuable, such as the Black Walnut, Honey Locust, and White or Burr Oak.

The Catalpa (Western Hardy) is a new species to this locality, and has not been fully tested. But its rapid growth, certainty of easy transplanting, resemblance of its wood to that of the Mulberry and Kentucky Coffee Tree, its known durability in other localities, and the cheapness of the plants, all tend to give it a place at the head of the list of forest trees for western Kansas.

I would further add such valuable species as the nut-bearing trees—Shell-bark Hickory, Pecan, and in some locations the American Sweet Chestnut. These have been undervalued and largely overlooked in the haste of our planters. White Hickory—generally known as Pig Nut or Bitter Hickory—is very valuable as a close-growing tree, and one which will renew its growth from the root whenever cut down in the winter season. The Western farmer can scarcely realize the advantage of a grove of this tough timber near at hand from which material can be obtained for withes and handles for many implements needed on a farm, as well as fuel.

HOW AND WHERE CAN SEEDS BE OBTAINED?

These are questions often asked by planters. Native mulberry seed is grown in large quantities in the forests skirting the Cottonwood river and its tributaries; also, those of the Kaw, Big Blue, Republican, and Smoky Hill. And for any deficiency in this sort, could well be substituted the Russian variety, by selecting from such trees as show the *Nigra* and *Tartarica* strain, always avoiding the *Alba* stock, as it is of a dwarfish nature, and only suitable for hedges and wind-breaks and its fruit food for birds. Of the Kentucky Coffee Tree and Ash, large quantities of the seed can be found along the Cottonwood river every fall. Large quantities of seeds of valuable species annually go to waste in our native forests along the water-courses which would be of untold value to our Western planters, and which might be gathered at a profit by boys and men who have leisure during the ripening season.

The greatest hindrance to a more general planting of forest trees is the enormous prices charged for seed, which can be so cheaply gathered by seed dealers, and which a large portion of the settlers on the Western prairies cannot afford to pay. If some means could be provided by which the planter and gatherer could coöperate, the area of forest-tree plantations would soon become very largely increased in this State.

These are only hints given, with the hope that those who have the forestry interest in charge may act in this direction to greater promote the interest of the State; and by which the planter may be able to obtain good and reliable seed at a reasonable rate.

RECOMMENDED LIST OF FOREST TREES FOR KANSAS.

The following list was recommended at the seventeenth annual meeting of the Society, to which reference is made in the county reports in this volume, and is arranged in the order of preference:

DECIDUOUS.

1. Black Walnut.
2. Catalpa (West. Hardy).
3. White Ash.
4. White Elm.
5. Osage Orange.
6. Cottonwood.
7. Ash-leaved Maple (Box Elder).
8. Honey Locust.
9. White (soft) Maple.
10. Red Elm.

EVERGREENS.

1. Red Cedar.
2. Black Austrian Pine.
3. Scotch Pine.
4. White Pine.
5. Norway Spruce.

List arranged in the order of the character of their wood:

CLASS 1—*Soft Woods.*

Cottonwood.
White Maple.
Ash-leaved Maple (Box Elder).

CLASS 2.—*Hard Woods.*

White Elm.
Red Elm.
White Ash.
Honey Locust.
Catalpa.

CLASS 3.—*Very Hard Woods.*

Black Walnut.
Osage Orange.

Durability.—The Catalpa and Osage Orange are the most durable when either exposed to the atmosphere or buried in the ground. The Ailantus, Black Walnut, Honey Locust, Mulberry, Ash and Elms are durable in dry places, and are desirable woods for inside finishing, and in the manufacture of many kinds of implements which are housed in bad weather. Most of the other classes decay rapidly when exposed to rains and the sun, and possess few valuable properties other than for a light fuel, temporary constructions, wind-breaks, and shade.

In their adaptability to locations and soils, all succeed best on lowlands, excepting the Ailantus, which is more hardy and produces the most valuable quality of wood when planted on gravelly or thin upland. The Honey Locust, Catalpa, White Elm and Osage Orange thrive quite satisfactorily on uplands; they resist the injurious effects of drouth,

and can be relied on when planted in such location. The varieties most valuable for their wood are Black Walnut, Catalpa (Western Hardy), Osage Orange, Ash, and Ailantus.

***Insect Attacks.*—The Honey Locust, Catalpa, Osage Orange and Black Walnut are the least liable to, in fact are almost exempt from, any damaging species. The last-named, within the past few years and in some localities, has suffered in foliage from the attacks of a species of the hand-maid moth, and fall web-worm; but as they live in families in their early stages, and form to themselves web-coverings, can be readily discovered and easily destroyed. Most of the soft-wood class, and the Ash and Elms of the hard-wood class, are liable to damage some seasons from the attacks of flat-headed borers and leaf-eating worms; but the attacks of borers usually occur during the year of planting and a low vitality in the tree, frequently caused by late spring planting, or neglect of culture and drouth. It can be largely averted by using seeds or one-year-old thrifty trees, and maintaining a vigorous growth by constant and frequent cultivation.**

ARTIFICIAL FORESTS, BY COUNTIES.

The following table shows the number of acres of artificially-planted forests, of the different varieties, by counties, and the grand total for the State. This office is indebted to the State Board of Agriculture for these statistics:

Counties.	*Black Walnut.*	*Maple.*	*Honey Locust.*	*Cotton-wood.*	*Other varieties.*	*Totals.*
Allen	103	143	2	49	90	393
Anderson	20	31	....	6	55	112
Atchison	156	216	7	220	68	667
Barber	4	2	....	9	17	32
Barton	208	28	26	592	533	1,387
Bourbon	115	557	....	3	621	1,296
Brown	87	276	33	610	1,089	2,095
Butler	999	319	36	1,689	2,829	5,862
Chase	878	642	278	1,931	1,127	4,856
Chautauqua	49	62	3	39	358	511
Cherokee	23	1,037	5	127	141	1,333
Clay	146	459	23	1,813	1,452	3,893
Cloud	162	42	25	2,664	1,281	4,124
Coffey	74	880	2	107	497	1,560
Cowley	106	126	5	743	367	1,347
Crawford*	99	140	5	19	427	690
Davis	98	60	5	200	97	460
Decatur	102	2	11	59	226	400
Dickinson	200	101	9	1,107	1,686	3,103
Doniphan	133	99	13	415	1,996	2,656
Douglas	40	54	2	32	26	154
Edwards	13	368	21	917	78	1,335
Elk	163	433	1	334	404	1,335
Ellis	42	2	11	736	153	944
Ellsworth	221	46	33	508	805	1,613
Finney	....	....	....	....	....	....
Ford	10	21	32	95	37	195
Franklin	328	387	158	57	1,286	2,616
Graham	19	1	8	131	311	470
Greenwood	93	42	1	95	804	1,035
Harper	109	157	26	1,568	655	2,515
Harvey	131	102	3	1,720	750	2,706
Hodgeman	15	1	3	18	9	46
Jackson	38	242	9	66	99	454
Jefferson	53	133	7	36	56	285
Jewell	171	94	16	2,195	2,132	4,608
Johnson	294	376	351	325	2,222	3,568
Kingman	51	73	1	895	297	1,317
Labette	63	274	11	92	759	1,199
Leavenworth	26	26	3	....	5,570	5,625
Lincoln	122	13	26	598	564	1,323
Linn	86	106	....	3	1,714	1,909

***There are at Farlington and vicinity about 1,200 acres, which should be added to the total for Crawford county.—G. C. B., SEC'Y.**

ARTIFICIAL FORESTS, BY COUNTIES—CONCLUDED.

Counties.	*Black Walnut.*	*Maple.*	*Honey Locust.*	*Cotton-wood.*	*Other varieties.*	*Totals.*
Lyon	36	6	....	13	27	82
Marion	290	35	2	573	1,280	2,180
Marshall	80	357	12	1,051	522	2,022
McPherson	425	202	13	2,421	1,632	4,693
Miami	100	116	13	28	2,938	3,195
Mitchell	255	29	86	1,336	834	2,540
Montgomery	33	156	4	62	686	941
Morris	42	88	12	115	1,307	1,564
Nemaha	131	249	28	499	983	1,890
Neosho	27	133	3	30	365	558
Ness	54	12	4	222	54	346
Norton	145	5	13	224	419	806
Osage	117	368	1	168	310	964
Osborne	355	5	499	1,379	861	3,099
Ottawa	120	62	3	1,632	951	2,768
Pawnee	25	1	28	245	132	431
Phillips	19	11	116	484	849	1,479
Pottawatomie	48	158	6	194	104	510
Pratt	92	36	....	506	45	679
Rawlins	11	3	1	51	83	149
Reno	429	95	7	4,467	1,467	5,465
Republic	91	260	222	2,574	1,346	4,493
Rice	286	68	20	1,896	1,589	3,859
Riley	70	79	3	303	122	577
Rooks	264	26	79	835	713	1,917
Rush	39	8	22	254	116	439
Russell	93	19	21	293	122	548
Saline	244	53	12	1,289	1,049	2,647
Sedgwick	210	99	6	3,157	795	4,267
Shawnee	42	95	5	207	2,909	3,258
Sheridan	....	....	....	....	....	....
Smith	642	72	92	1,069	989	2,864
Stafford	108	7	26	1,638	233	2,012
Sumner	167	131	20	1,962	1,239	3,519
Trego	9	1	5	129	85	229
Wabaunsee	177	68	5	109	1,209	1,568
Washington	83	266	27	1,247	1,927	3,550
Wilson	73	551	4	23	727	1,378
Woodson	217	330	3	23	1,084	1,657
Wyandotte	....	58	....	....	55	108
Total	11,500	12,486	2,637	55,533	65,771	146,140

Total number of acres returned to State Board of Agriculture	146,140
Farlington Forests, which returns to State Board of Agriculture do not show	1,200
Grand total acres of artificial forests in the State	147,340

FORESTRY BY COUNTIES.

The following county reports on forestry have been compiled from answers to circular No. 4, for 1885, which is as follows:

SECRETARY'S OFFICE, KANSAS STATE HORTICULTURAL SOCIETY,
LAWRENCE, August 10, 1885.

DEAR SIR: By an act of the Legislature, it is made the duty of the Secretary of this Society to publish a Forestry Manual annually. The State Legislature has kindly provided the necessary funds to cover the expenses of an edition of six thousand copies for 1885 and 1886, and instructed the distribution in following manner, viz.: Fifteen copies of said Manual to each member of the Legislature, and the remainder of said annual edition to the several counties according to population.

You are earnestly requested, as a friend to the forestry interest of our State, to assist in making the Manual a reliable guide to forest-tree planters, by giving all the information practicable upon the subjects embraced in the following questions. Yours very truly, G. C. BRACKETT, *Secretary.*

QUESTIONS.

1. What was the condition of artificially-planted forest trees in your county at the opening of the spring of 1885?
2. Was the planting extensive the last spring compared with that of previous years?

3. **Was it successful?**
4. **What per cent. failed?**
5. **What varieties were most extensively used?**
6. **What varieties were most successfully grown?**
7. **The following list has been recommended by the Society, in the order given:**

1. **Black Walnut.**
2. **Catalpa, Hardy.**
3. **White Ash.**
4. **White Elm.**
5. **Osage Orange.**
6. **Cottonwood.**
7. **Ash-leaved Maple (Box Elder.)**
8. **Honey Locust.**
9. **White Maple (Soft Maple.)**
10. **Red Elm.**

Questions relating to the List.

1. **Are they successful in your county?**
2. **How do you treat them?**
3. **What are the faults of each, if any?**
4. **What means do you recommend to overcome objections to the varieties in the list?**
5. **What insects attack these varieties, and what are your remedies?**
6. **Can you recommend substitutes for any in the list, which are more desirable for your county?**

Please arrange the foregoing list (making any substitution and addition you may consider an improvement in the order of merit, as determined by the experience of practical forest-tree growers in your county.

Miscellaneous Questions.

1. **Do you advise planting on uplands, as profitable for fuel, fencing, and other purposes, where wood is needed on a farm? If so, please arrange a list of varieties in the order of success and value of such locations.**
2. **For lowlands.**
3. **What special treatment, if any, do you recommend for upland plantations?**
4. **Has the Russian Mulberry been tried in your county? If so, is it hardy and vigorous, and does it promise to make a tree of good size, and desirable?**
5. **On what soils and locations does it thrive the best?**
6. **Are the conditions of climate and soil more congenial to forest-tree growth than formerly? If so, what are the changes observed, and what in your opinion are the causes?**
7. **Do you believe, from your observations and experience, that the Western prairies can be made to produce forest trees sufficient to meet the wants of settlers thereon?**

NOTE.—The references in these reports are to the Society's recommended list, which is as follows: 1. Black Walnut; 2. Catalpa (Western Hardy); 3. White Ash; 4. White Elm; 5. Osage Orange; 6. Cottonwood; 7. Ash-leaved Maple (Box Elder); 8. Honey Locust; 9. White (Soft) Maple; 10. Red Elm. These are classified as to texture and durability of wood, and in the order of comparative value, on page 48.—SEC'Y.

NORTHERN DISTRICT.

ATCHISON COUNTY.—BY THOS. F. COOK, MONROVIA.

The condition of artificially planted forests in the spring of 1885 was good, and the area planted in the spring was equal to that of previous years, and as successful, failures being very light. Black Walnut and White Maple were most extensively used, the former being considered the most valuable for timber and the latter for a rapid growth.

The list recommended by the Society has been successfully planted, the only objections being to the White Maple, on account of the attacks of the maple worm, which defoliates it; the Cottonwood not being adapted to highlands, and the Osage Orange to lowlands. I would, however, arrange the list in the following order of comparative merit: 1. Black Walnut, 2. Catalpa (Western Hardy), 3. White Maple, 4. Honey Locust, 5. White Elm, 6. White Ash, 7. Ash-leaved Maple, 8. Osage Orange, 9. Cottonwood, 10. Red Elm. I would advise planting on uplands of the following varieties: 1. Black Walnut, 2. Catalpa (Western Hardy), 3. White Maple, 4. Osage Orange; and for lowlands, 1. Black Walnut, 2. White Maple, 3. Cottonwood. Plant in rows about the same distance apart as given corn, and cultivate during the first two or three years, and when necessary thin out.

A few Russian Mulberries were planted the present year, for the first time.

From observation and experience, I believe that our Western prairies can be made to produce forest trees sufficient to meet the wants of settlers thereon.

CLAY COUNTY.—By A. R. Keeler, Clay Center, and J. B. Quinby, Wakefield.

Forest-tree plantations in the north half of the county were in good condition at the opening of spring, while in the south half they were not thrifty, owing to neglect. Cottonwood trees on a sandy soil, and a few protected groves of Black Walnut, looked well. Plantings this season were heavier in the northern portion and equal to that in previous years, and were successful — not to exceed 5 per cent. failing. The Cottonwood, Black Walnut, Ash-leaved Maple (Box Elder), White Maple, Catalpa, White Ash, Red Elm, White Elm, Osage Orange and Honey Locust were most extensively used. The kinds named in the recommended list of the Society are grown successfully. They are planted in rows from four to twelve feet apart, and from two to twelve in the row. The land should have deep tillage before being planted, and thorough culture afterward. "As to distances for varieties, I would recommend the following: Black Walnut and Catalpa, four feet each way; White Ash and Osage Orange, rows four feet and in the rows two feet apart; White Elm, four feet in the row, rows six feet apart; Ash-leaved Maple and Honey Locust, four by eight feet; White Maple and Red Elm, eight feet by eight; Cottonwood, twelve feet each way. These distances are varied because of the different natures of the trees named."—(Keeler.) Substitutes: "Hackberry is preferred to either White Ash or White Elm. I would rearrange the list according to comparative merit in this locality as follows: 1. Black Walnut, 2. Catalpa, 3. Osage Orange, 4. Cottonwood, 5. Ash-leaved Maple, 6. White Maple, 7. Hackberry (added), 8. Honey Locust, 9. White Ash, 10. Red Elm, 11. White Elm."—(Quinby.) If planting is to be on upland, for timber, would recommend: Black Walnut, Catalpa, Osage Orange, Red Elm, Honey Locust, and White Ash; for fuel, Cottonwood, Peach, White Maple, and Ash-leaved Maple; for wind-breaks, Willow, Peach, White Maple, and Ash-leaved Maple. For lowlands, all the foregoing will succeed. The success depends mainly on careful planting and thorough cultivation through the first years. Mulching is desirable, and close planting encourages an upright growth and straight bodies.

Russian Mulberry: "In my opinion it is a humbug."—(Keeler.)

The conditions of climate and soil have become more congenial to forest-tree growth than formerly. Rains are more frequent and copious; hot winds and severe and lasting drouths are not so common an occurrence. These changes are evidently the result of planting trees — forest and fruit — hedges, tillage of the land, and preventing prairie fires. Judging from the climatic changes going on in this portion of the State since its settlement, undoubtedly our western portion will in due time support a large and prosperous agricultural population.

DECATUR COUNTY.—By J. B. Colt, Oberlin.

Forest-tree planting was more extensive the present than in any prior years, and largely successful. The Black Walnut, Honey Locust, Osage Orange, Cottonwood, White Ash, Ash-leaved Maple, Elm and Catalpa Speciosa or Western Hardy were most extensively used. The Catalpa grows readily, but needs shade while young. Osage Orange kills back by the cold of some winters. All the rest of the list I have named are safe to plant.

The Russian Mulberry has not been extensively used, but from the evidence promises to be successful, if planted when one year old from the seed.

Uplands are decidedly preferable for forest trees.

The conditions of climate and soil are more congenial to forest-tree growth than formerly. Rainfalls have increased, and are more frequent, and I am convinced from observation and experience that the "Western prairies" will produce sufficient wood-growth to meet the wants of settlers thereon, if planted and properly attended to.

DICKINSON COUNTY.—By Prof. J. W. Robson, Cheever.

(North half.)

Forest-tree plantations were in good condition at the opening of spring, excepting ten-year-old Cottonwood trees grown upon the uplands, which are failing from the attacks of borers. The Black Locust, of same age, has suffered also from the borer common to that tree. The area planted this season was not more extensive than in previous years, but successful wherever carefully cultivated. Not to exceed ten per cent. failed. The Catalpa, Black Walnut, White Maple, Ash-leaved Maple, Cottonwood and Russian Mulberry were most extensively planted.

All of the kinds named in the Society's recommended list are growing vigorously in this county, excepting Cottonwood, which is failing from age on upland; planted on lowlands it makes a magnificent growth. It may be safely used for nurse trees to other sorts. For general planting, the Japan Hybrid Catalpa may be used as a substitute for the Cottonwood. I would rearrange the Society's list in the following comparative form for valuable plantations: 1. Black Walnut, 2. White Elm, 3. Red Elm, 4. Honey Locust, 5. Catalpa (Western Hardy), 6. White Ash, 7. Ash-leaved Maple, 8. Osage Orange, 9. White Maple, 10. Japan Hybrid Catalpa.

I advise planting on uplands for fuel, fencing, and other purposes wherein wood is needed on a farm, and would use Ash, Ash-leaved Maple, White Maple, Red Elm and Cottonwood for fuel; and White Elm, Osage Orange, Honey Locust and Black Walnut for other purposes. For lowlands would use the same varieties, but more extensively of Cottonwood and Willow for fuel and material for building sheds and shelters. All forest-tree plantations should receive clean cultivation for the first four years after planting, and be judiciously thinned out and the trunks pruned after the fifth year. The Cottonwood, however, should never be pruned, as such a practice produces conditions inviting the attacks of borers.

Russian Mulberry: This tree has been planted in this county to a limited extent. It grows very brushy, and is not promising of a good-sized tree.

The conditions of climate and soil are now more congenial to forest-tree growth than formerly. By "breaking up" the surface of the prairies, rains are retained where needed and by planting groves of trees evaporation is retarded.

From observation and experience I believe that the Western prairies can be made to produce forest trees sufficient to meet the wants of settlers thereon.

(South half.—By E. Eichholtz, Detroit.)

All forest-tree plantations were in good condition at the opening of the spring of 1885. In some parts of the county the spring planting was very extensive, and successfully treated. The Russian Mulberry, Catalpa (Western Hardy), Yellow Locust, Cottonwood, Maples, Ash-leaved Maple, Linden (Basswood), Black Walnut, Ailantus, Kentucky Coffee Tree, Oaks, Pines and Red Cedar were planted and successfully grown. Recommended list, arranged in the order of comparative merit: 1. Black Walnut, 2. Ailantus, 3. Russian Mulberry, 4. Yellow Locust, 5. Catalpa (Western Hardy), 6. White Ash, 7. Red Elm, 8. Maples, 9. Kentucky Coffee Tree, 10. Linden (Basswood). I advise planting on uplands the following list: 1. Black Walnut, 2. Ailantus, 3. Russian Mulberry, 4. Yellow Locust. This list embraces the more rapid growers, and which are easily grown; will furnish abundance of fuel in the shortest time, and posts for use on a farm. For lowlands: 1. Ailantus, 2. Catalpa (Western Hardy), 3. Russian Mulberry, 4. Black Walnut, 5. Maples, 6. Ash, 7. Elms, 8. Kentucky Coffee Tree, 9. Yellow Locust. These will give entire satisfaction to the planter.

Plantations of forest-tree seedlings require good cultivation; should be set in rows four feet apart each way, and not deep, as there are more failures occurring from deep planting than from any other cause. The earth must be firmly pressed about the roots when set. At the close of the first year's cultivation, mulch the rows with old hay or straw.

Insects: Borers attack the Cottonwood and Maple trees, and the Maples are subject to defoliation by a worm.

Russian Mulberry: This tree has been planted in this county, and makes a rapid growth. It is a promising sort, thriving equally well on good upland and lowland.

The conditions of climate and soil are more congenial to forest-tree growth than in former years. Rains are more regular, and drouths and hot winds are less injurious.

From observations and experience, I am confident that, by a judicious selection of suitable kinds of forest trees, our Western settlers can grow sufficient wood to meet the wants of such material on the farm.

DONIPHAN COUNTY.—By J. F. Glick, Highland.

The condition of artificial forests in this county was good at the opening of spring in 1885. The planting was not as extensive as in previous years, but successful—not to exceed 10 per cent. failing. Cottonwood, Catalpa (Western Hardy), and White Maple were mostly used. All the varieties named in the Society's recommended list are considered hardy and desirable, and I would not change any of them for others. The following are the only objections to any in the list: Black Walnut a slow grower; Catalpa, owing to its rapid growth, is easily broken; should not be trimmed up during the first two years. The objection to the Black Walnut can be remedied by planting on rich land and giving it surface dressing each year.

Planting and treatment: Seed of the Black Walnut should be planted in the fall, in rows four feet apart each way. Cultivate each year thereafter the same as for corn. Plant Catalpa in the spring, in rows four feet apart and two feet in the row. One-year-old plants are preferable. For White Ash, White Elm, Ash-leaved Maple, White Maple, Red Elm, follow directions for the Catalpa above given, excepting to mulch the White Ash with coarse manure. In planting the Osage Orange and Honey Locust, use two-year-old plants; Cottonwood, use cuttings. All should receive annual cultivation, as recommended for the Black Walnut. Most any of our uplands would produce a better forest-tree growth if made rich by a liberal manuring, and deep and thorough tillage before being planted.

The Russian Mulberry is hardy, but needs heavy pruning to give it form and size in body. It succeeds on any good upland.

Forest trees succeed better than formerly, owing to an increased rainfall. I believe, from observation and experience, that the Western prairies can be made to grow forest trees sufficient to meet the wants of our people.

ELLIS COUNTY.—By Martin Allen, Hays City.

The condition of artificially-planted forests was good at the opening of the spring of 1885. More trees were planted the present season than in any year before, and were quite successful where well cared for; none failed, except where neglected. The Honey Locust, Ailantus, Catalpa, Ash-leaved Maple, Cottonwood, Osage Orange and Black Walnut were principally used. All the varieties named in the Society's recommended list are successfully grown in the county.

Faults of the varieties, and suggested means for remedying them: Black Walnut does not successfully transplant, therefore plant the seed where the tree is to be grown. The large leaves of the Catalpa are materially injured by heavy winds, therefore plant under the shelter of other species, and in naturally protected localities. White Ash is a very slow grower, and should be planted on very rich land. White Elm makes a poor quality of timber, but being an excellent shade tree, should be used for such purposes only. Osage Orange is a slow grower, and should be planted on rich land. As the Cottonwood is not successful on upland, it should be planted in special localities that catch the wash from adjacent lands. Ash-leaved Maple forms more like a large bush than a fine tree, and had better be planted for wind-breaks than for any other purpose. Honey Locust is the least objectionable of any in the list; wherever planted it succeeds.

For uplands, the following list is recommended, and the varieties are preferred in the order named: 1. Honey Locust, 2. Hackberry, 3. Catalpa (Western Hardy), 4. Black Locust, 5. Ailantus, 6. Red Elm, 7. Ash-leaved Maple.

For lowlands, with present experience, I would advise using the following varieties, preferred in the order named: 1. Wild Cherry, 2. Black Walnut, 3. Catalpa (Western Hardy), 4. Honey Locust, 5. Osage Orange, 6. Hackberry, 7. Green Ash, 8. White Elm, 9. Red Elm, 10. Cottonwood, 11. Ash-leaved Maple, 12. Black Locust, 13. Ailantus. Were it not for the inveterate disposition of the last two named to sprout from their roots, I would put them much higher in the list. I would always plant the Catalpa, Black Locust and Ailantus in the center rows; the first for the protection afforded by the surrounding trees, and the others because of the shade which will largely prevent the growth of sprouts.

Land which is to be used for forest-tree plantations should be rich and well prepared by repeated plowing. I would use young plants of all species in planting, excepting the Black Walnut, of which use the seed, and plant in the fall by dropping it where the tree is wanted, and with the heel of the foot pressing it well down into the newly-prepared ground. Young trees, not to exceed one year old, should be planted in a deep furrow, a little deeper than when standing in the nursery. Thorough culture is necessary until the trees shade the land.

Russian Mulberry has been tried, and seems to be hardy and vigorous. It grows more like a spreading bush than a stately tree, and is well adapted for low, dense wind-breaks. I have tried it only upon ordinary upland.

Insects: White Ash, Ash-leaved Maple and White Maple are some years injured by borers. The leaves of the White Elm are attacked by a gall-louse, and the Cottonwood by rust. Of the others, I know of no insect injuring them.

Our climate and soil have become very much more congenial to plant-growth than formerly; rains are more gentle, and better distributed, and the atmosphere generally moist. Among the primary causes producing these changes may be mentioned the following: The destruction of the buffalo, which fifteen years ago were so numerous here as to keep all herbage closely cropped, and by their continual tramping the surface of the land was packed very hard. Quite probably the extensive destruction of forests in the Middle States, which has been followed by a drying-up of springs, swamps, and even streams of water, has also had its effect in causing the surplus moisture to pass into other regions, and the plains of Kansas are getting their share of it. For more immediate cause we look to the reviving of the surface of the land by plowing, which allows the rainfalls to penetrate its depths; the prevention of prairie fires; a taller and denser growth of grass, which largely prevents the rapid passage of rainfalls from the general surface into ravines and water-courses; also, the recent appearance of weeds all over the country, unknown fifteen years ago, that retain the drifting snows, which by melting soak into the earth, thereby increasing its moisture. All these and many other causes combined operate in the great work of redeeming these vast prairies from their wild and barren condition, fitting them for agricultural purposes, and homes for man. If as important changes occur in the coming years as have during the past occupancy of these Plains, I can see no reason for any doubt of their ability, under an intelligent management, to produce all the forest-tree growth needed by the settlers thereon.

ELLSWORTH COUNTY.—By C. L. Meyers, Ellsworth.

(Central portion.)

Forest-tree plantations were in a number-one condition at the opening of the spring of 1885. The area has been successfully increased annually for the past six years. Failures in the planting of the present season have not exceeded three per cent.

Osage Orange, Honey Locust, Black Locust, Maple, Catalpa and Russian Mulberry have been most extensively used, with a few Ailantus. All of the varieties named in the Society's recommended list are reasonably successful in this county, excepting the Cottonwood. The Black Walnut should be planted on sandy loam of bottom lands. The varieties at all objectionable are the Cottonwood (as stated above) and the Ash-leaved Maple; the latter on account of its liability to destruction by the attacks of borers. If I were to suggest any substitution, it would be the Black Locust in place of the Black Walnut.

I do advise planting on uplands — as profitable for fuel, fencing, and other purposes where wood is needed on a farm — the following sorts, which are preferred in the order named: Black Locust, Honey Locust, Russian Mulberry, Osage Orange, Ash, and Ailantus. For lowlands: Catalpa (Western Hardy or Teas's Hybrid), Russian Mulberry, White Maple, White Elm, Black Walnut, Cottonwood (if low bottoms). Upland plantations should receive about the same treatment as those on lowlands.

Russian Mulberry has been planted on all classes of locations; is hardy and vigorous, and promises to make a tree of good size.

The conditions of climate and soil have been more congenial during the past three years for forest-tree growth than in previous years. The changes are an increased humidity, brought about by the planting of trees and extensive cultivated fields.

From observations I am satisfied that by intelligent management our Western prairies will produce forest trees sufficient to meet the wants of the settlers thereon.

(Western portion.—By F. J. Swehla, Wilson.)

All varieties of forest trees were in a good condition in the spring of 1885, excepting the Catalpa, the tops of which had been winter-killed.

Plantings in the spring were more extensive than in previous years, when we take into consideration that all Government lands subject to entry under the timber-culture act of Congress had been filed on.

The past season has been a favorable one for successful tree-planting in this county, and such efforts have resulted satisfactorily, as I do not learn of any failures from climatic causes. Honey Locust, Russian Mulberry, Green Ash, Black or Yellow Locust, Catalpa and Cottonwood were most extensively used.

I would not recommend planting on rolling lands where the soil washes away and the rains drain off quickly. The following locations are preferable: Low creek or river bottoms, along the banks; of the uplands, select the ravines if there are any. If not, then the levelest ground. If you must plant on sides of hills, use an eastern, northeastern or northern exposure. These locations are named in the order preferred. On such highlands I would plant of the list in the following order as preferred: 1. Honey Locust, 2. Black or Yellow Locust, 3. Black Walnut, 4. White Ash, 5. Red Elm, 6. Russian Mulberry, 7. Catalpa, 8. Hackberry, 9. Green Ash, 10. Osage Orange. For lowlands: 1. Black Walnut, 2. White Ash, 3. Green Ash, 4. Red Elm, 5. White Elm,

6. White Maple, 7. Ash-leaved Maple, 8. Honey Locust, 9. Yellow Locust, 10. Russian Mulberry. To both lists I would add all kinds of native oaks for their beauty. The Osage Orange will endure more unfavorable situations than most of the sorts named, but its thorns are serious objections; and it is not recognized by the general land department —I know not why.

Treatment of seeds: The seed of Black Walnut should be planted where the future tree is to form; plant in autumn, two or three inches deep. White (soft) Maple and Elms, as soon as it falls and before it dries. Honey Locust seed must be scalded just before being planted. Osage Orange should be sprouted by soaking in warm water, and then planted in warm, moist land. Other seeds may be planted either in spring or fall.

Management of upland plantations: If on a slope, plant the rows to run at right angles with the slope. This, with the necessary cultivation, will prevent washing and often retain rainfalls until the water will be absorbed by the ground. After cultivation ceases, mulch with every available material. It will not only stimulate growth, but to some extent prevent washing.

Russian Mulberry: This tree has only been planted in this county during the past two years. It appears to thrive on upland and lowland; is hardy and vigorous, and promises to make a tree of good size.

Our climate is variable and uncertain. The years of 1877 and 1878 were very favorable to the growth of trees, and such were the years of 1884 and 1885; but other years were equally unfavorable. The main lack of this county is an abundance of rain. I notice that the winters following the summers of copious rains are much colder than others.

Every farmer in this county can, if he makes a determined, intelligent effort, produce in ten or fifteen years sufficient of timber to meet his wants in fuel, construction, poles, etc., and grow a hedge fence for his inclosures. But I have no faith in the efforts or opinions that the Western prairies can be reforested.

GOVE COUNTY.—By Vandemark Smith, Hackberry.

Artificially-planted forest trees were in very good condition at the opening of the spring of 1885. The plantings of the present season were successful. Cottonwood and Hackberry were most extensively used. Of the Society's recommended list, the Black Walnut, Catalpa (Western Hardy), Osage Orange, Cottonwood, Ash-leaved Maple and Honey Locust are successfully grown in the county. The White Ash, White Elm, White Maple and Red Elm do not set their roots sufficiently deep to enable the tree to endure a drouthy season.

Insects: None trouble forest trees excepting a large green worm on the Cottonwood, and a hairy-covered worm on the Hackberry.

The Hackberry and Cottonwood are natives of this county. These, with the Osage Orange, Honey Locust, and Black Walnut, all succeed on our lowlands, and all except the Cottonwood on the uplands.

The system for planting adopted is as follows: Back-furrow the land into ridges ten feet wide until the open furrow is two feet deep. In this furrow dig holes two feet deeper, and plant in rows east and west. The advantage of this furrow is to form a receptacle for holding rainfalls and snowdrifts, which, when melted, supplies the moisture needed for the trees. It is a good plan to plant sorghum between the rows to shade the land and young trees, leaving the stalks standing through the winter as a catch for snowdrifts, which will furnish moisture for another year.

The Russian Mulberry has not been planted in the county that I am aware of.

The conditions of climate and soil are much more congenial to the growth of plants than formerly. We are having about three times the amount of rain and snow that we did six years ago, and all classes of native plants are becoming more numerous, and more completely covering the land. Even the "beautiful" wild sunflower is springing up on the prairies. I believe, from observation and experience, that the Western prairies will be made to produce sufficient forest-growth to meet the wants of the settlers thereon.

GRAHAM COUNTY.—By Robert Boys, Whitfield.

Forest-tree plantations, wherever properly cared for, were in good condition at the opening of the spring of 1885. The planting of the present year was more extensive than that of the previous one, and was successful. Failures did not exceed 10 per cent.

All the varieties named in the Society's recommended list succeed in the county, excepting the Cottonwood when planted on uplands, and the Catalpa, the planting of which in this county I am not aware of. Forest trees could be profitably grown on our lowlands, using the Cottonwood, Black Walnut, White Ash, and Osage Orange. I would plant all of these kinds in the spring, excepting the Black Walnut, the seeds of which do best when bedded out in the fall, covered lightly, and planted in spring-time.

Russian Mulberry has not yet been planted in the county, but preparations are being made to use it in the spring planting.

Since the settlement of the county there is a discoverable change in the climate, in that the rainfalls are more frequent, and crops are more abundant.

JACKSON COUNTY.—By Jacob Hixon, Holton.

(*North half.*)

Forest-tree plantations were in a good condition at the opening of spring. The planting in 1885 was not extensive, as this county is well supplied with a natural product.

All of the varieties named in the Society's recommended list succeed in this county, and I have no changes to offer; but from present indications the Cottonwood will be a short-lived tree.

Of insects, only the maple worm is troublesome some years. No means to prevent their ravages have been used.

I do advise planting forest trees in any locality where nature has failed to produce them. They are profitable for fuel, fencing and many other purposes on a farm.

Russian Mulberry has been planted in this locality; appears to be hardy, and a vigorous grower; succeeds best on rich, loamy soils.

Our climate has certainly changed from what it was twenty years ago. The growth of forest trees is more vigorous, and the rainfall has increased, which I believe is owing to the break-up of the broad prairies, and their planting to crops of grains and trees.

I firmly believe that as the Western Plains are settled and brought under cultivation, rains will follow and become more plentiful, and forest trees will be grown in abundance to meet the wants of the people in those regions.

(*South half.—By J. W. Williams, Cope.*)

The condition of forest-tree plantations was reasonably fair at the opening of spring. Those planted the present year were quite successful, though not extensive. The Catalpa, Russian Mulberry and White Maple were most extensively used.

All the varieties named in the Society's recommended list are grown in the county. The main faults are, the Cottonwood is too short-lived, and the White Maple is liable to defoliation by the maple worm. Substitutes: I would use the common native Mulberry in place of the Cottonwood, and Red Cedar for the Osage Orange, as its growth is fully equal, is ornamental, and the wood as valuable, if not more so.

I advise planting forest trees on upland, and recommend the following list, valued in the order named: 1. Black Walnut, 2. Catalpa (Western Hardy), 3. White Ash, 4. Red Cedar, 5. White Maple, 6. Ash-leaved Maple (Box Elder), 7. Native Mulberry, 8. White

Elm, 9. Red Elm, 10. Red-bud. For lowlands, reject the Red Cedar, Ash-leaved Maple and Red-bud, and use Cottonwood, Honey Locust and Hackberry.

I would recommend the planting of all seeds in nursery form, and transplanting to permanent grounds at one year old, excepting the Black Walnut, which should be planted in the fall, and covered lightly. Of the Cottonwood, use cuttings made from thrifty wood in the fall, and carefully preserved until spring. Plant all trees in rows sufficiently apart to permit of thorough culture each season during the first six years.

Insects: None are troublesome, except the fall web-worm, and they are not seriously so; the maple worms, which were numerous a few years ago, for the past two years have disappeared.

Russian Mulberry: This tree seems to thrive on all characters of soils; is hardy, and promises to make a good-sized tree.

I believe the climate and soil have become more congenial to the growth of forest trees than when the county was first settled. We have an increased rainfall at least, which renders the soil more productive. I am of the opinion that this has to a large extent been brought about by the extensive area of land brought under cultivation, and the extensive planting of trees, both fruit and forest.

From observations and experience, I am confident that with proper care and attention to the work, forest-tree growing will be made a success on all our Western prairies.

JEFFERSON COUNTY.—By Edwin Snyder, Oskaloosa.

(*North half.*)

Forest-tree plantations were in a good condition at the opening of last spring. The planting of 1885 was not extensive but successful. White Maple, Catalpa, Elm and Ash-leaved Maple were generally used.

The Society's recommended list needs no changing. All the varieties therein named succeed in this county when carefully planted and cultivated during the first two years.

Insects: None are annoying except borers in the Locust trees.

Russian Mulberry has been planted, but not enough is known of its habits to speak of.

I am of the opinion that the climate has changed; at least, to the extent of an increased rainfall over former years, and from experience and observation I believe changes are going on in the western portion of the State which will enable the settlers on those Western prairies to grow forest trees sufficient to meet their wants.

(*South half.—By H. R. Roberts, Perry.*)

All artificially-planted forest trees were in a healthy condition last spring. The present year's planting was simply for door-yard ornamentation and shade, as this county is abundantly supplied with natural forest trees.

The Society's recommended list needs no changing. All of the varieties therein named succeed.

I would advise planting forest trees in any locality where there is not a natural product in sufficient quantity to meet the wants of the settlers.

It is apparent that we are having more rains than fell during the early settlement of this county, and I can attribute it to no other cause than the breaking up of the prairies and the planting of trees.

I am fully convinced that wherever man can grow enough grain, etc., to subsist on, there also can trees be grown; and this statement would have as much force when applied to our Western Plains as here in Jefferson county.

LEAVENWORTH COUNTY.—By E. J. Holman, Leavenworth.

Artificially-planted forests were in good condition at the opening of the past spring. The planting of this season, though not extensive, was fully successful, and most extensively of the White Maple.

The varieties named in the Society's recommended list are successful in this county, when thoroughly cultivated a few years after planting. All do well when planted on lowlands, and on uplands excepting perhaps the Honey Locust. I would add to the list the American Chestnut and deciduous Cypress, as promising valuable trees for this county.

Insects are not seriously troublesome to our forest trees.

Russian Mulberry: This has been planted too recently to justify an opinion, based on experience.

The conditions of climate and soil are more congenial to forest-tree growth in late years than formerly, by an increased humidity in the atmosphere, and an increased capacity in the soil for retention of rainfalls.

From observations and experience, I am convinced that in time our Western prairies will produce forest trees in sufficient quantity to supply the wants of settlers thereon.

(*By J. C. Baird, Easton.*)

The condition of artificially-planted forest trees was good in the spring of 1885. The present year's planting was successful, though not extensive. Cottonwood, Ash-leaved Maple and Maple were mostly used, and were equally successful. The Catalpa, Red Elm and Honey Locust I consider worthless at this age of our State. Cottonwood trees twenty-five to thirty years old are dying considerably on uplands.

Objections: Catalpa is a slow grower, and not sufficiently dense to produce a good shade. Red Elm is a slow grower, and worthless when grown. Honey Locust is only fit to look at—no other good qualities to recommend it. For the first, substitute American Chestnut; for the second, Red Cedar.

I would recommend the following: Black Walnut, Osage Orange, American Chestnut, Red Maple, Red Cedar, Cottonwood, White Pine, Hard (Sugar) Maple.

Insects: Do not trouble our trees in this locality.

I should not advise planting forest trees in this county, only for shade. For fuel, use coal, and for fencing, wire.

Russian Mulberry: Do not know of any planted in the county.

As to climatic effects, none of our hardy sorts suffer, and only the Cottonwood when planted on uplands.

Forest-tree culture by the average Western farmer is a humbug—a legal dodge, to get a quarter-section of land more than a squatter is entitled to.

LINCOLN COUNTY.—By John H. Lord, Cedron.

(*North half.*)

The condition of artificially-planted forest trees in this county at the opening of the spring of 1885 was good, except the Ailantus, Common Catalpa, Teas's Hybrid Catalpa, and the Mulberry, which were injured by the severity of last winter.

Planting was more extensive the past spring compared with that of previous years, but was very successful—not over five per cent. failing.

Varieties most extensively used: Catalpa, Mulberry, Ash, Honey Locust, White Maple, Cottonwood, Black Walnut, and Ash-leaved Maple.

Varieties most successful: Catalpa (Western Hardy), Black Walnut, Honey Locust, White Ash, Hackberry, White Elm, Cottonwood, Ash-leaved Maple, White Maple, and Mulberry.

The Society's recommended list is successful in this county, when planted on lowlands;

but the Osage Orange, Cottonwood, Ash-leaved Maple and White Maple do not succeed as forest trees on our upland under the usual treatment.

Faults: The Honey Locust, while one of the hardiest trees for our upland, has the only fault of being thorny. This may be overcome by selecting and planting seeds of the thornless ones. Young Elms are seriously ravaged by rabbits; but by cutting the young tree back to the ground a strong shoot can be grown which in a few years will not be troubled by them. Substitute the Hackberry for the Red Elm.

I would recommend the following list for this county, and in the order named: 1. Black Walnut, 2. Catalpa (Western Hardy), 3. White Ash, 4. Osage Orange, 5. Honey Locust, 6. Hackberry, 7. White Elm, 8. Cottonwood, 9. Ash-leaved Maple, 10. White Maple.

I regard upland planting as profitable for fuel, fencing, and other purposes on a farm, and prefer the following list of varieties: 1. Black Walnut, 2. Catalpa (Western Hardy), 3. White Ash, 4. Honey Locust, 5. Hackberry, 6. White Elm, 7. Red Elm, 8. Red Cedar, 9. Scotch Pine, 10. Black Locust, 11. Mulberry, 12. Ailantus, for poor, gravelly land. The seedling Peach tree and Morello Cherry make good fuel, and afford some fruit.

For lowlands I would reject Red Elm, Red Cedar, Scotch Pine, Black Locust and Mulberry from the list above, and add Osage Orange, White Oak, Cottonwood, Ash-leaved Maple, and White Maple.

I have a two-acre grove, containing all of the varieties named in the Society's list; they are now four years planted. The land was cropped with corn for several years before planted to trees. Mostly one-year-old trees were used, excepting Black Walnut, and of which seed was used. These were planted in trenched rows twelve feet apart, running north and south, and four feet in the rows. In the space between the rows two rows of corn were planted each year, until now the trees occupy the space, and mostly shade the ground. Cultivation has been done with a one-horse double-shovel plow only, and a hand hoe to remove such weeds as the plow did not reach. I have aimed to cultivate shallow, but thoroughly, to keep the ground level, mellow, and free from weeds. This grove is becoming more beautiful every year. *Cultivation* has done it.

Insects: The Ash-leaved Maple while young is often attacked by borers. When the trees are properly cultivated, they disappear.

The Russian Mulberry is being tried in this locality. I have it on good bottom-land, and have given it good cultivation now for three years. It was killed badly the past winter, and fails to meet the high claims to merit given it, either in tree or fruit. It certainly belongs to the bushy or brushy class of trees, if it is a tree, and the fruit is of little account; but it should not be wholly rejected. On common upland soil its growth is slow; on rich lowlands it is not hardy in severe winters. I have native Plum trees that have made a stronger growth, and borne larger and better fruit.

A marked change is observed in our climate. The atmosphere is more humid, rainfall more copious, uniform, and at regular intervals; caused evidently by the settling of this and the country west of us, the breaking up of large tracts of prairie, cultivation of the soil, restriction of prairie fires, which formerly swept the whole country, the construction of artificial ponds for watering of stock, by damming ravines, and the disappearance of buffalo grass, giving place to blue-stem, which serves as an immense mulching of the surface of the land, retaining moisture and enriching the soil.

It is my conviction that in the course of time the whole of western Kansas will be made to bring forth fruits, forest and ornamental trees, grains and vegetables, sufficient to meet the wants of man settled thereon.

(*South half.—By J. Weidman, Pleasant Valley.*)

The condition of forest-tree plantations was good at the beginning of spring. The planting of the present year was very successful, and greater in extent than that of previous years. Black Locust, Honey-Locust, Catalpa, Ash, Ash-leaved Maple, White

Maple, Russian Mulberry, Native Mulberry and cuttings of the Cottonwood were most extensively used. The Black Locust, Catalpa, Honey Locust and Russian Mulberry afforded the most satisfactory results in growth.

The recommended list of the Society is well adapted to our lowlands, while the Catalpa, Honey Locust, Black Locust and Native Mulberry are best for our uplands.

Before planting any variety, their natures and requirements should be well understood, and then select such locations and soils as are suited to their natures. Many trees fail because of the unsuitableness of the locations, and others because of the character of the soil, which may be too wet or too dry, or lacking in some particular essential to meet the wants of the tree.

Cultivation should be given all classes during the first three years at least, and in the forepart of the growing season mulching is good, but clean culture is better.

Insects: The flat-headed apple-tree borer is the only species which attacks the trees, and is found in the White Ash, Cottonwood, Ash-leaved Maple, and White Elm.

Russian Mulberry: I have tried this tree for more than ten years. It will not make a profitable tree for timber. It is well adapted to the production of hedges; grows on any kind of land. After once started, it is hard to kill out. The only value I can see is in its fruit, for birds and not for man, and by having plenty of them they may serve as a protection of our other fruits, as birds are dear lovers of its berries, and seek them in preference to all others.

For the past few years rains have been abundant, hence forest trees have made a luxuriant growth.

Surely will the Western prairies, in time, be made to produce an abundant forest-tree growth, and the settlers' wants will be supplied with wood of their own growing.

MARSHALL COUNTY.—By D. Harbaugh, Waterville.

The condition of forest-tree plantations at the opening of the spring of 1885 was generally good. Planting the present season was about equal in extent with previous years, and was successful, only about five per cent. failing. The Catalpa, Cottonwood and Ash-leaved Maple were mostly used.

The Society's recommended list succeeds in this county. I have no objections to offer, except to the Cottonwood and White Elm. The former is evidently short-lived on our uplands; the wood of the latter is not durable for posts.

I do advise planting on our uplands, for fuel, fencing, and other purposes, where wood is needed on the farm, the following varieties, which are here arranged in the order of success and value for such locations: Black Walnut, Catalpa, White Ash, Red Elm, Ash-leaved Maple, White Maple, and Cottonwood. For lowlands, I would reject from this list the Catalpa and White Ash.

The Russian Mulberry has not been tried in this county, that I am aware of.

Insects: I know of none infesting forest trees planted in this county, excepting a green worm, found on the White Maple.

The conditions of climate and soil have materially changed, and become more favorable to tree-growth: first, we have more rains, and second, fewer winds, caused by the breaking up of large tracts of land, and the cultivation and planting of trees; and I believe that when the Western prairies are subdued in like manner by the settlers, forest trees will be grown on them in quantity sufficient to meet the wants of the farmers of that region.

MITCHELL COUNTY.—By E. A. Taylor, Beloit.

The condition of forest-tree plantations in the spring of 1885, which were properly cultivated the preceding year, was good; others were sickly. Such as were planted the present year were a success, not to exceed 5 per cent. failing. The Catalpa (Western Hardy), Honey Locust, Ash and Cottonwood were most generally used.

The following rearrangement of the recommended list of the Society is according to their preference for planting in this county, on lowlands: 1. Catalpa, 2. Ash, 3. Honey Locust, 4. Black Walnut, 5. Red Elm, 6. Osage Orange, 7. White Maple, 8. Cottonwood, 9. Ash-leaved Maple, 10. White Elm. For uplands: 1. Catalpa, 2. Ash, 3. Honey Locust, 4. Cottonwood.

Plant on well-plowed land, in rows twelve feet apart and six feet in the row, and give such cultivation as is required for corn until five years old, or longer if practicable.

The conditions of climate and soil are becoming more favorable to success in forest-tree culture each year.

From observations and experience, I believe that the Western prairies will be made to produce forest trees in sufficient quantity to supply the settlers with an abundance of wood for the needed purposes on a farm.

NEMAHA COUNTY.—BY W. E. WILKINSON, SENECA.

The condition of forest-tree plantations was good in the spring of 1885, and such as were planted the present year and properly taken care of were a success. In extent it was double that of any preceding year. The Russian Mulberry, Catalpa (Western Hardy), White Ash and some White Walnut were principally used.

All the varieties named in the Society's recommended list, excepting the White Elm, Honey Locust and Red Elm, are successfully grown in the county. The Elms are slow growers, and do not meet with encouragement for timber purposes. Black Walnut is a rather slow grower when young, but makes valuable timber. Honey Locust does fairly. Catalpa and Mulberry hold the lead for plantations.

I advise planting on uplands as profitable—Mulberry and Catalpa for posts, and White Maple and Cottonwood for summer fuel, which if thoroughly cultivated will yield satisfactory results. For lowlands: Catalpa, Maple, Black Walnut, and Cottonwood.

Insects: A few maple worms and fall web-worms trouble the Maple and Black Walnut trees.

Russian Mulberry: We have this tree now three years old, growing on different soils successfully; is a rapid grower, and appears to be hardy. It grows brushy, and will need to be trimmed to make a nice-bodied tree.

The climate has become more favorable to tree-growing during the past twelve years, by an increased humidity. If the people on our Western prairies give proper attention and energy to the culture of forest trees, I can see no reason why they will not be able to produce wood for fuel and other purposes needed on a farm.

(*By E. L. Rosenberger, Sabetha.*)

The condition of forest-tree plantations at the opening of the spring of 1885 was good, and such as were planted this season were a success, and more extensive than in any year preceding. Failures did not exceed five per cent. Black Walnut, Catalpa, White Ash, Cottonwood, Ash-leaved Maple, White Maple and Russian Mulberry were principally used.

The kinds mentioned in the recommended list of the Society are successfully grown in this county, and success varies only according to the amount of care and cultivation given them. They are adapted to upland and lowland. Treatment for uplands is mainly thorough cultivation. I planted the Catalpa on thin upland; a portion was well cultivated, and these made a growth the first season of over four feet, while the others, of same age and size, set out the same day, and within ten feet, but not cultivated, did not make a growth of six inches. In the spring of 1885 I planted yearling Catalpa trees on bottom land, in rows four feet apart each way, and cultivated the same as for corn. These made a growth of from four to six feet high.

Planting and treatment: Black Walnut seed should be frozen, and when they begin to sprout in the spring, plant them where the tree is to grow; cultivate, and keep clean of weeds. All others I prefer to grow in nursery rows, about four feet apart, and from one to two inches in the row. Hand-weed and cultivate, and transplant to permanent grounds at one year old.

Insects: None have been troublesome the past season.

The Russian Mulberry has been planted in a limited extent during the past two years, on both upland and bottom land; is invariably most thrifty where cultivated. It makes a rapid growth, and appears to be hardy; is inclined to grow brushy, and makes a good hedge plant; will require trimming to make a timber tree.

NORTON COUNTY.—By John O'Toole, Devizes.

(North half.)

All forest trees planted in 1884 were in condition at the opening of spring, and made a good growth in 1885. Planting has not been extensive in this county, owing to the land not having been under cultivation a sufficient length of time to justify such an undertaking. But what was planted, and received proper care, are doing well. Planting the coming year will be quite extensive. Black Walnut, Cottonwood, Ash and Locust for groves; and Osage Orange, Ash-leaved Maple, Cottonwood, Catalpa and some Russian Mulberry were largely used for timber-belts.

Varieties which are most successfully grown are the Black Walnut, Cottonwood, Ash-leaved Maple, Osage Orange, Ash, Catalpa, and in the order named. The Black Walnut is too slow a grower for uplands. The Catalpa is more desirable, and with the Ash-leaved Maple, Honey Locust and White Maple are the most satisfactory growers of any in the Society's recommended list. Red and White Elm are slow growers. I would substitute the Hackberry, which is a native of this county, grows rapidly, and is a desirable tree to plant on the Western prairies.

I would arrange the list in the following manner, and according to comparative merits of each: 1. Catalpa (Western Hardy), 2. Black Walnut, 3. Red Elm, 4. White Elm, 5. White Ash, 6. Honey Locust, 7. Ash-leaved Maple, 8. Osage Orange, 9. Cottonwood (short-lived on upland), 10. White Maple. For uplands: Use in the order here given of the above list, Nos. 1, 2, 3, 4, 5, 6, 8, 7.

A western slope is preferred on which to plant. Prepare it by deep plowing, and if practicable, subsoiling. Use only sound trees. Plant thickly in rows four feet apart, as they will soon shade the land, keeping down weeds, and better hold the falling leaves for a mulch. Nature sows thickly, and the best only survive. Thin out as the growth begins to interfere. Thorough cultivation should be given each year until August 1st.

The Russian Mulberry has been largely planted, and endured the cold of the past two winters even on lowlands, where it thrives the best. The only objection is its dwarfed and spreading growth; but it is valuable for hedges and wind-breaks.

The climate and soil are more congenial to forest-tree growth than formerly. Fruit trees are doing equally as well. The moisture is penetrating the land deeper every year.

I am confident, from my experience in this county, that forest-tree culture can be made a success on these Western prairies.

(South half.—By J. J. Anderson, M.D., Edmonds, and G. A. Lathrop, Lenora.)

The condition of forest-tree plantations in the spring of 1885 was very good, and plantings the present year were as extensive as in previous years. There was not to exceed 5 per cent. loss where proper care was given. The Cottonwood, Ash-leaved Maple, Ash and Black Walnut have been the main trees used, but I believe that most of the varieties named in the Society's recommended list will succeed on bottom-lands. For the upland, Catalpa, Ash-leaved Maple and Honey Locust should be used.

I am confident that such varieties as the Black Walnut, White Ash, White Maple and Osage Orange will make a very slow growth. I would not advise planting on the uplands. For the bottoms I would use Cottonwood, Catalpa, White Elm, Ash-leaved Maple, Honey Locust, White Maple, and Red Elm.

To be successful here, trees must be planted at least twelve feet apart, as there is not moisture enough in the earth to sustain trees if planted as closely as they are in the eastern portion of the State.

The conditions of climate and soil are more congenial to forest-tree growth than formerly. During the last two years there have been early spring rains, and they have been more evenly distributed through the summer months. The causes are attributed to the settling of the country and prevention of prairie fires.

I am confident that our Western prairies can be made to produce enough forest trees to supply the needs of the settlers.

OSBORNE COUNTY.—BY M. MOHLER, OSBORNE CITY.

(*North half.*)

The condition of forest-tree plantations in the spring was very good, and such as were planted the present season have been a success, scarcely five per cent. failing. Black Walnut and Honey Locust were mainly used.

All the varieties named in the Society's recommended list are successfully grown in this county, either on upland or lowland. The Cottonwood is strictly a lowland tree. It might be made successful on the upland by mulching; but as other trees are more valuable when grown, it is no longer planted. A more suitable list for this county would be the following, and preferred in the order named: 1. Black Walnut, 2. Honey Locust, 3. Osage Orange, 4. Catalpa.

The Black Walnut should be grown from seed planted in autumn, where the trees are intended to remain. Others varieties are grown from seed, in the nursery, for one year, and then transplanted, and each year mulched. Thorough cultivation would probably answer as well, but farmers generally fail to give it such attention.

Insects: There are none as yet which trouble the trees.

I do not advise planting for the profits which may be realized in a mercenary line, but for a permanent and everlasting grove, and that my children and their children may enjoy the luxury of its shade. Every grove and forest that is planted here is needed, and will be needed forever to modify the extremes of climate, and render it more highly conducive to the welfare and prosperity of the inhabitants.

The Russian Mulberry has not been extensively planted yet; it is hardy and vigorous, but does not seem to make a desirable tree; it grows low and bushy, and I think it is overestimated; thrives on all soils.

The conditions of climate and soil are more favorable to tree-growth than formerly, in an increased humidity and more productive soil. These changes are attributed to the large area brought under tillage, whereby the rainfall is retained, and more gradually returned to the atmosphere, to be again formed and returned to earth in rains; also the already planted trees aid in bringing about these changes. Each tree successfully planted makes easier the next.

Forest trees will be grown upon our Western prairies, not so much to furnish the settlers with fuel and fencing, but as modifying agents, to render the climate more conducive to a successful agriculture. For such a purpose they will be valuable, yea, almost indispensable.

(*South half.—By W. G. Short, Twin Creek.*)

Forest-tree plantations were in very good condition at the opening of spring in 1885. Plantings the present season were equal in extent to that of previous years, and were the most successful of any of the thirteen years of my experience in this county. Black Walnut, Honey Locust, Osage Orange, Catalpa, Ash-leaved Maple and Cottonwood were generally used.

Of the varieties named in the Society's recommended list, only Black Walnut, Catalpa, Osage Orange, Ash-leaved Maple and Honey Locust are successfully grown in the county.

Objections: White Ash is greatly injured by the borer. White Elm, White Maple and Red Elm are too slow growers for this climate. The Cottonwood dies at from four to six years after planting. I do not know of a successful plantation of this variety over six years old. I have not been able to discover a satisfactory cause, but think death commences at the root.

For upland, would recommend Black Walnut, Honey Locust, and Osage Orange, in the order named. For lowlands: First, the above-named, to which add Catalpa and Ash-leaved Maple.

I would recommend that trees be planted in rows four feet apart each way. Cultivate thoroughly until the trees become too large to work among or cultivate during the first two years, and then mulch. I prefer this latter mode, as it keeps the ground soft and moist. This treatment applies equally to upland or lowland plantations.

The conditions of climate and soil are more favorable to forest-tree growth than formerly, caused by an increased and more general rainfall, displacing of the buffalo grass by blue-stem, the roots of which penetrate the earth to a great depth and thereby loosen the subsoil; also, its heavier growth forming a shade and mulch, and protecting the ground from parching by hot suns and drying winds, thus preventing the rains from running off the land into creeks and rivers.

If the same attention is given to forest-tree plantations as should be given to crops by the settlers on the Western prairies, I can see no reason why those regions will not produce all the wood and timber which may be needed for farm purposes.

OTTAWA COUNTY.—By C. H. Sheffield, Delphos.

(*North half.*)

Forest-tree plantations were in very good condition at the opening of spring in 1885. Planting during the season was equal to that in previous years, and very successful, as not to exceed two per cent. failed. The Ash-leaved Maple, White Maple, Cottonwood, Elm, Ash and Catalpa were generally used. The last-named variety is becoming very popular.

All the varieties named in the recommended list of the Society are quite successfully grown in this part of the county. Objections: The Cottonwood is short-lived on upland. The Black Walnut and Osage Orange head the list for timber and profit.

For uplands, I recommend the following list, which is named in the order of comparative merit from the experience of practical forest-tree growers in this county: Black Walnut, Osage Orange, Catalpa, White Maple, Ash-leaved Maple, and White Elm. For lowlands, I would reject White Maple and White Elm, and add Red Elm, Honey Locust, and White Ash. All plantations should have thorough cultivation, and mulching is a great advantage.

Insects: Ash-leaved Maple and Ash are attacked by borers whenever the tree becomes stunted.

Russian Mulberry has been tried and proven to be hardy; is not a rapid grower, but desirable. It promises to make a tree of good size; succeeds best on second-bottom land, but makes a good growth on any rich loam.

The climate and soil have become more favorable to forest-tree growth than formerly —a more even temperature, more humid atmosphere, and a more generous rainfall.

I believe, from experience and observations, that the Western prairies will be made to produce a sufficient forest-tree growth to meet the wants of the people settled in those regions.

(*South half.—By Will. Goddard, Minneapolis, and J. C. Hobson, Windsor.*)

The condition of forest-tree plantations in the spring of 1885 was good, where properly cultivated. In some localities the present season's planting was more extensive than in previous years, and entirely successful. Catalpa (Western Hardy), Black Walnut, Russian Mulberry, White Maple, Cottonwood, Ash-leaved Maple, Elms and Ash were principally used.

The recommended list of the Society is well suited to this locality, and all the varieties are successfully grown on either upland or lowland; but there are some varieties which are safer to plant on upland, as the Catalpa (Western Hardy), Russian Mulberry, White Ash, White Mulberry, and Honey Locust. These, with the remainder of the list, are used in lowland plantations. It is a question whether the Cottonwood, Ash-leaved Maple, White Elm and Honey Locust are profitable trees, on account of the character of their wood, where others more valuable can be so easily grown. As a nurse tree, the Cottonwood is valuable. Some of the Oaks are successfully cultivated, and afford valuable wood.

Planting and treatment: All forest trees should be planted on deep and well-prepared land, in rows four feet apart, thoroughly cultivated, and wherever practicable, mulch. Thorough cultivation adds much to the vigor of trees, which condition is one of the best means for protecting them from attacks of borers.

The Russian Mulberry has been extensively planted within the past two years, and certainly promises to be a good tree for Kansas. It does well on uplands, but better on rich bottoms.

Our climate is vastly more congenial to tree-growth than in former years. Rainfalls have increased, and are more evenly distributed; high winds are less frequent. These changes are due to the settling of the country, the tilling of extensive fields, and planting of trees and crops of grain.

Our Western prairies can in time be made to produce a sufficient quantity of forest trees to meet the wants of the settlers thereon.

PHILLIPS COUNTY.—By John W. Knodle, Dickeyville.

The condition of forest-tree plantations at the opening of the last spring was good wherever they were well cultivated the previous years. Such as were planted the present year, and intelligently treated, were a success. These were principally made by settlers of the land under the timber-culture act of Congress, who used the Cottonwood, Ash-leaved Maple, Black Walnut, Black Locust, Green Ash, and Mulberry.

The varieties named in the recommended list of the Society are successfully grown. I would add thereto the Black Locust and White Mulberry.

The best tree for our uplands is the Black Locust, and I would not recommend any others than this and the Ash-leaved Maple. For lowlands, the best and preferred kinds are the Black Walnut, White Walnut, Black Locust, Ash-leaved Maple, Catalpa (Western Hardy), Green Ash, White Elm, White Ash, Red Elm, and White Maple. To this may be added the European Ash, White Mulberry, and White Willow.

Planting and treatment: Black Walnut—plant the seed in autumn; of other varieties use two and three-year-old trees, excepting the Catalpa, of which use yearlings. Give them careful cultivation as long as there is space between the rows to work.

Insects: None are prevalent.

Russian Mulberry has been planted, and is hardy and vigorous; does not promise to be a good timber tree; thrives best on rich bottom land.

The conditions of climate are more congenial to plant-growth. There has occurred a great change within the last five years. From an aridity, ruinous to vegetation, we now have sufficient moisture to sustain the growth of most any tree. I attribute this change to the opening up by tillage of large areas of the buffalo-grass regions, which were impervious to water, and over which devastating winds had unobstructed sweep. Even our natural, unbroken prairie is undergoing the process of a restoration to fertility. The long grass [blue-stem?] is taking the place of the short buffalo grass, thereby better protecting the earth's surface, as with a mantle, from the burning effects of the summer's sun. We have no reason to expect a return of the arid conditions which prevailed in the past.

From my observations and experience I am satisfied that these Western prairies will produce ample forest-tree growth to meet the wants of the settlers.

POTTAWATOMIE COUNTY.—By J. L. Browne, Wamego.

The planting of forest trees in this county for other purposes than for shade and the lawn has not been extensive. The present year's planting has been successful. Black Walnut, Cottonwood, Ash-leaved Maple, White Maple and Catalpa have been successfully used.

All the varieties named in the Society's recommended list are successful in the county, and generally satisfy the planter.

Russian Mulberry has been planted, but not largely.

From observation and experience, I believe that the Western prairies can be made to produce sufficient forest-tree growth to meet the wants of the settlers thereon.

RAWLINS COUNTY.—By W. A. Mikesell, Atwood.

Forest-tree plantations in some localities were in a good condition at the opening of the spring of 1885. The planting of the present season was about the same in extent with that of previous years, and when properly taken care of was successful. Cottonwood, Ash-leaved Maple, White Ash, Catalpa and Black Walnut were most generally planted, and succeeded in the following order: Ash, Black Walnut, Ash-leaved Maple, and Cottonwood.

All of the varieties named in the Society's recommended list have been successfully grown in this county, excepting the Catalpa, Osage Orange, and Red Elm. The Cottonwood thrives until five or six years old, and then begins to die. If well cared for, all the varieties named in the recommended list, excepting Catalpa, Osage Orange, and Red Elm, succeed on upland, but Cottonwood, Ash-leaved Maple and Willow do best on lowlands.

My practice has been to plant seed where I wanted the tree to grow for timber or shade, and keep the land well cultivated and clear of weeds.

Russian Mulberry grows finely, and is hardy. Four-year-old trees are eight feet high, and two and a half inches in diameter. These are on uplands, and I do not know of any growing on lowlands.

Yes, I believe that forest trees can be grown in sufficient quantity on these Western prairies to supply the settlers with all the wood they need for fuel, fencing, etc., as well as in eastern Kansas, if proper care is bestowed.

RILEY COUNTY.—BY A. SOUTHWICK, RILEY CENTER.

(North half.)

The condition of forest-tree plantations in the spring of 1885 was good whenever they had been properly cared for. The planting of the present season was more extensive than in any previous year, and entirely a success. The Catalpa (Western Hardy), White Maple and Cottonwood were principally used.

The kinds recommended in the Society's list are all successfully grown. Black Walnut, Catalpa, Osage Orange, Cottonwood and White Maple are by far the most extensively planted, and most generally preferred. The Black Walnut has the objection of being a slow grower, White Ash and Ash-leaved Maple of being attacked by borers, the Cottonwood of being short-lived on the uplands, and in some localities the White Maple is defoliated by the maple worm. Most of these objections can be overcome by planting sound and vigorous trees, on a deep and well-prepared soil, and giving them thorough and constant culture. As substitutes, I would offer the Russian Mulberry for the Ash-leaved Maple.

A plantation of ten or fifteen acres of forest trees in every quarter-section, and kept in good, healthy, growing condition, would be as profitable as the same amount of land in any other crop. For upland, I would use Black Walnut, Catalpa (Western Hardy), Osage Orange, White Maple, and White Elm. All of these should be planted on deep, rich soil, or they will fail. For lowlands, Black Walnut, Catalpa (Western Hardy), Osage Orange, Cottonwood, White Maple, Honey Locust and Red Elm are most desirable.

Planting and treatment: A thorough preparation of the land by fall plowing and harrowing in the spring is essential to the success of forest trees. Mark out the rows with a plow, four to six feet apart, and plant one or two-year-old trees, three to four feet apart in the rows. Give them sufficient cultivation to keep down all weeds until the first of August, and each year until their shade will prevent weeds and grass from growing. Of Black Walnut, the seed should be planted as soon as ripened in autumn, in rows as above stated, and the following spring be given two or three good dressings with a harrow; then hoed until large enough to be run through with a cultivator. Upland plantations must have special attention. The land must be prepared in autumn as deep as practicable, and thoroughly mellowed. Use the most healthy and vigorous trees, and which have an abundance of fibrous roots; spread these out in natural position, and press the earth between and upon them; cut the tops well in, and give extra culture, never allowing the ground to become baked or weedy. In each spring plow under all leaves which have remained on the ground. Thin out as fast as is needed to secure a good growth, and tree-raising will pay.

Russian Mulberry has been planted during the last two years, and thus far seems to be hardy and vigorous.

There has been a gradual change both in climate and soil, making them more congenial to the growth of forest trees than formerly. Rains are more evenly distributed throughout the growing seasons, and the soil benefited. An examination of the annually-formed rings of wood-growth in trees seem to justify this conclusion, by their more equal thickness through a period of years. This change is doubtless the result of the opening up for tilth and crop of large areas of land which absorb nearly all the rains that fall and which are again given out in the form of vapor, thereby rendering both soil and air more moist and better adapted to plant-growth.

That the prairies can be made to produce timber sufficient for the wants of the settlers in the greater part of Kansas, has been proven beyond a doubt, and the time has come when every farm on which there is not already enough timber, ought to have at least ten acres planted at once. It will pay in every way more than can now be estimated.

(*South half.—By T. C. Wells and J. W. Blain, Manhattan.*)

Forest-tree plantations in the county were generally in good condition at the opening of spring in 1885. The planting in the spring of the present season was not extensive, and was mainly for wind-breaks, shade and ornament, but was fairly successful. Black Walnut, Hackberry, Catalpa, White Ash, Cottonwood, White Elm and Ash-leaved Maple were most commonly used. There was not much difference in the results as to these varieties.

All the varieties named in the Society's recommended list have been successfully grown in this county; the Catalpas are of a recent introduction.

Plant the seed of Black Walnut, and one-year-old trees of all other varieties, where you intend to form the future tree; the Cottonwood will grow quite as readily from cuttings as from roots. Have had good success from planting in rows from four to six feet apart, and two to four feet in the row. Cultivate similar to that required for corn, until the growth has become sufficient to shade the ground, and thus keep the weeds subdued. Good care and cultivation will overcome some of the faults in varieties, and especially aid in efforts to prevent and suppress some of the insects attacking them.

"Burr Oak, in my opinion, should take the place of the Catalpa. All our Oaks are superior to the White Elm, Cottonwood, Ash-leaved Maple, Honey Locust, White Maple, Red Elm."—(J. W. Blain.)

The following list is offered, arranged in the order of comparative merit, considering value of timber and rapidity of growth: 1. Black Walnut, 2. White Maple, 3. Cottonwood, 4. Ash-leaved Maple, 5. White Ash, 6. Red Elm, 7. White Elm, 8. Catalpa (Western Hardy), 9. Honey Locust, 10. Osage Orange.

"I do advise planting forest trees on upland as profitable for fuel, fencing, etc., and would repeat the above list not only for uplands, but also for lowlands."—(T. C. Wells.)

"The Russian Mulberry has been planted on lowlands, but has not been sufficiently tried to warrant conclusions. Most certainly do I believe, from observations and experience, that the Western prairies can be made to produce forest trees in sufficient quantity to meet the wants of settlers in that region."—(J. W. Blain.)

ROOKS COUNTY.—By Samuel A. Hebrew, Rockport.

(*North half.*)

Forest-tree plantations were in good condition at the opening of the spring of 1885. Plantings of the present year were extensive and very successful, not to exceed ten per cent. failing. Black Walnut, Mulberry, Ash, Black Locust and Honey Locust were most generally used.

All the varieties named in the Society's recommended list have been successfully grown in this county excepting the Catalpa, which is killed by the winters, and the White Maple by worms. Substitutes: Would recommend Black Locust in place of White Maple; it being successfully grown here.

I advise planting forest trees on upland as profitable for fuel, fencing and other purposes where wood is needed on a farm. For such lands, the Black Walnut, Black Locust, Mulberry and Ash are well adapted, and for lowlands, Cottonwood, Elm, and Ash-leaved Maple.

Insects: Borers ruin the White Maple in spite of our best efforts to save it from their attacks.

Russian Mulberry has been tried, and so far has given satisfaction. It is a rapid grower, and thrives wherever it has been planted.

I believe in time that the Western prairies will produce sufficient of forest trees to supply the settlers thereon with all the fuel, fencing and for such purposes as wood is needed on their farms. But it will take work to do it.

(*Central portion.—By Thos. Murtey.*

STOCKTON, ROOKS COUNTY, KAS., August 17, 1885.

G. C. Brackett, Lawrence, Kas.—Dear Sir: Your forestry blank is at hand. A great many forest trees have been planted in this county this year. Trees have made a vigorous growth, and are a success. The kinds planted are Cottonwood, Ash, Black Walnut, White Maple, Ash-leaved Maple, Catalpa Speciosa, and Mulberry. Cottonwood is not a success on the uplands; its roots do not penetrate the earth to a sufficient depth. The dry winds in July and August dry the ground down to the roots, and the tree dies. Its leaves are devoured by worms in the latter part of the summer. On bottom lands it is a success. Ash is a tree suited to the climate in western Kansas. The roots penetrate deep into the earth, and obtain moisture from below the surface. It remains always fresh and green during the dry months of August and September. Black Walnut is successful. Its growth is slow, but substantial. Its wood and fruit are valuable. White Maple is an excellent tree. It is a success in this county. Ash-leaved Maple makes a vigorous and rapid growth, and is well adapted to the climate. Catalpa and Mulberry have been tried to a limited extent, and are successful so far.

In planting trees in western Kansas, great attention should be paid to cultivation the first three years, and kept as clean as corn. After a few years they will shade the ground, and the weeds will then be harmless.

(*South half.—By C. N. Burroughs, Zurich.*)

Forest-tree plantations were not in as good condition last spring as usual, on account of the severe cold of last winter. The present season's planting was equal in extent to that of previous years, and was a success. The failures did not exceed five per cent. The Catalpa, Black Walnut, Ash-leaved Maple, Maple, Ash, Cottonwood, Black Locust, Ailantus and Honey Locust were most extensively used.

All the varieties named in the recommended list of the Society are successfully grown in this county. The Cottonwood should not be planted on the uplands. In such locations plant the Black Walnut, Ash and others which maintain their tap-root with age, whether on upland or lowland.

Thorough cultivation should be given all forest plantations.

Insects: The Cottonwood is injured by some kind of a beetle, and a worm which stripped whole groves of their foliage. The Ash is also attacked by a worm, and defoliated.

Russian Mulberry has been tried to some extent, and from present appearances will make only a small, scrubby tree, requiring a great deal of trimming.

The condition of climate and soil is more congenial to plant-growth than formerly. We have an increased rainfall, which has increased the productiveness of the land.

I believe the Western prairies can be made to produce more forest trees than will be needed by the settlers thereon.

RUSSELL COUNTY.—BY J. B. CORBETT, BUNKER HILL.

Artificially-planted forest trees were in good condition at the opening of the spring of 1885. Plantations made the present season were successful, not to exceed fifteen per cent. failing. The following varieties are most extensively planted: White Maple, Honey Locust, Cottonwood, Catalpa, and Ash-leaved Maple.

All the varieties named in the recommended list of the State Society are a success in this county.

Faults: The Black Walnut is a slow grower, and does not easily transplant. Cottonwood is short-lived on our uplands, but does well on the bottom land. The Black Walnut should be grown by planting the seed where the future tree is to be grown. A deep tillage of the land before planting will greatly increase the growth. Ash-leaved Maple should be allowed to form its head low, and be cultivated well to secure a rapid growth, which would enable it to resist the injury of flat-headed borers.

I would offer the following list, in the order named, as preferred to the Society's list for this county, viz.: 1. Black Walnut, 2. White Maple, 3. Honey Locust, 4. Catalpa (Western Hardy), 5. Ailantus, 6. Cottonwood, 7. Russian Mulberry, 8. Ash-leaved Maple, 9. Ash, 10. Red Elm, 11. Osage Orange. Of this list, Nos. 1, 2, 3, 7 and 10 are well suited to our uplands, while the entire list succeeds on lowlands.

Planting and after-treatment: The soil in this locality requires deep plowing and thorough preparation before planting. Set the trees in rows, that the land may be kept loose and free from weeds during the spring and summer seasons by cultivation, which is preferable to mulching. In two or three years the trees will care for themselves.

Insects: The Black Walnut, Catalpa, Osage Orange and Honey Locust are exempt from attacks, while the others are more or less liable.

The Russian Mulberry has been lightly planted during the past two years. Last year it made a rapid growth, and promises to make a good-sized tree.

The conditions of climate and soil are more congenial to forest-tree growth than formerly. The multiplied conditions for condensing moisture, are such as cultivating the land, planting groves and orchards, building houses, constructing artificial ponds, etc. The chief cause is the rapid disappearance of the buffalo grass and the advent of the bluestem, which makes a rank growth during July and August, thereby furnishing protection to the land.

The conditions of climate and soil are fifty per cent. more favorable to the growth of timber and fruits than when I first came to this county in 1871. Even then we found the streams skirted with a fair growth of timber. On the sandy soil of the Saline and Smoky the Cottonwood prevailed, and had in many places attained to a large size. Bordering the tributaries of these rivers were found Black Walnut, Ash, Elm, Ash-leaved Maple, Oak, Red Cedar, and Hackberry. On some branches of Wolf creek, in this county, where the native timber has been protected and cared for by the settlers, the homesteaders have an abundance for their own uses. On some quarter-sections there are from fifteen to twenty acres.

Therefore, from my observation and experience in this county, I believe that the Western prairies can be made to produce forest trees sufficient to meet the wants of the settlers thereon.

SHAWNEE COUNTY.—By H. W. Lipp, Rossville.

(*North of the Kansas river.*)

The condition of forest plantations was good at the opening of spring, and such as were planted the present season made a satisfactory growth, and were mainly constructed for wind-breaks of the following kinds: Cottonwood, White Maple, Ash-leaved Maple, and Catalpa. There has been a great demand for the last named.

The varieties named in the recommended list of the Society all succeed in the county. I recommend planting on uplands as profitable, and for such locations the Black Walnut, Catalpa, Osage Orange, Cottonwood, Honey Locust, White Maple, Ash-leaved Maple and White Elm are well suited, and are a success when planted on lowlands. These plant in rows twelve feet apart, and from four to eight feet in the row; give the same cultivation as required for a corn crop.

Russian Mulberry has been planted on upland clay. It promises to make a good-sized shrub. Not very desirable.

Our climate is more favorable to plant-growth than formerly. Rains are more frequent and evenly distributed.

From observations and experience, I believe the Western prairies can be made to produce sufficient forest trees to meet the wants of the settlers thereon.

(*Central portion.—By Thomas Buckman, Topeka.*)

Generally forest-tree plantations were in an excellent condition at the opening of the last spring, and such as were planted the present season are doing well. The extent of planting was about equal to that of previous years, with the exception of the Catalpa (Western Hardy), of which many more were planted. Failures were light, and did not exceed ten per cent. The Catalpa (Western Hardy) and Russian Mulberry were mainly used the present year.

Of the varieties embraced in the Society's recommended list, the Black Walnut does well on bottom or rich slopes; Catalpa and White Ash, fairly successful; Cottonwood and White Maple, fully so; Red Elm is uncertain, excepting on river bottoms; White Elm, as a shade tree; and the Osage Orange, fairly successful. At this time there are only two varieties that I can recommend for the planting of timber lots—the Black Walnut and Catalpa. The first should be grown from seed, planted permanently in the fall, and in rows ten feet apart, and four feet in the row. The seed should be covered to a depth of three inches. When the trees are four years old, remove all ill-shaped ones, or such as do not promise to make valuable trees.

Catalpa: Use yearling trees, and plant in spring, in rows, same distances as recommended for the above. It is a great advantage to the future tree, if when planting the top is cut down to near the collar, in which case it sends up a strong, vigorous shoot, which will form a nice body.

All lands intended for forest trees should be thoroughly prepared before planting.

Russian Mulberry: There are several groves of this tree in our county, and it seems to thrive on most all soils. It is hardy and vigorous, and promises to make a fair-sized bush in time, but never a good-sized tree. It certainly is suitable for forming windbreaks, and furnishes an abundance of food for birds.

I do not think our climate or soil are more congenial to forest-tree growth, but the present greater success is traceable to better selections of all kinds of trees and locations, and more intelligent management.

I have no doubt but that whenever the people on our Western prairies make a judicious selection of kinds, whose natures will conform to the peculiar conditions of soil and climate of those regions, and learn how to handle and grow them upon intelligently selected locations, having in view their suitableness for such purposes, they will produce forest trees in sufficient quantity to meet their wants.

(*South half of Shawnee and northern portion of Osage county.—By J. G. Clark, Waveland.*)

The condition of forest-tree plantations was good in the spring of 1885, and such as were planted this season were a success, as everything has been favorable. The extent of planting increases each year, and more was planted the present season than in the one preceding.

All the varieties named in the recommended list of the Society, excepting Cottonwood, were used, and are successfully grown. The excepted tree is short-lived on the prairie and its wood is not valuable. I would add to the list Hackberry, Red Cedar, and Austrian Pine, rejecting the Cottonwood or placing it at the bottom of the list and raise the Osage Orange to No. 3.

I advise planting forest trees on upland, and such as are found in the Society's list, and the same for lowlands.

Our seasons are more congenial to tree-growth than formerly, as we have more copious rains. This is attributable to the prevention of the fires which swept over our lands, destroying the grass and other material which served as a natural mulch. The opening to cultivation of a large portion of land, planting of hedges and trees, also conduces to a more favorable condition. Undoubtedly in time the Western prairies will be made to produce forest trees ample to supply the settlers' wants for wood.

SMITH COUNTY.—By C. J. Holmes, Gaylord.

The condition of artificially-planted forest trees on last spring was good. The extent of planting during the present season was equal to that in previous years, and very successful. Honey Locust, White Ash, White Elm, Black Walnut, Catalpa, Ash-leaved Maple and White Maple were most extensively used.

All the varieties named in the Society's recommended list are successfully grown in the county. The Cottonwood generally dies early when planted on uplands, and may be rejected from the list as unworthy of culture, and in its place use Black Walnut.

Forest trees can be profitably grown on our uplands, and would recommend for such locations, as specially preferable, the Honey Locust, Black Walnut, Catalpa, Osage Orange, and White Elm. With good culture they do well.

The climate and soil are now decidedly more congenial to plant-growth than formerly, and I believe the Western Plains will be made to produce sufficient forest trees for all such purposes as are needed on a farm.

TREGO COUNTY.—By W. B. Kritchfield, Wakeeney.

All forest-tree plantations in this county were in a good condition at the opening of spring, and such as were planted the present season were successful, but not more extensive than in former years. The Catalpa, White Ash, Elm, Honey Locust, Cottonwood and Osage Orange were most extensively used.

Of the varieties named in the Society's recommended list, the following seem to be adapted: Ash, Osage Orange, Catalpa, and Ash-leaved Maple. The Hard Maple, so far as tried, is quite promising. Black Walnut, Cottonwood and White Maple are not so well adapted to this county.

A safe list to use in planting groves, etc., would be as follows, arranged in the order of preference: 1. Osage Orange, 2. Ash-leaved Maple, 3. Catalpa, 4. White Elm, 5. Honey Locust, 6. Hard Maple, 7. White Ash. These last two make a slow growth.

Russian Mulberry: This tree has been planted in the county. It makes a slow growth, and I cannot at present express an opinion as to its value. All trees should have thorough culture throughout the season.

The conditions of climate and soil are becoming more favorable to tree-growth.

WASHINGTON COUNTY.—By Dr. Chas. Williamson, Washington, and Alex. Spiers, Linn.

(North half.)

The condition of forest plantations in the spring of 1885 was good, and such as were planted the present season made a successful growth. In extent it is about equal to that of preceding years. The varieties most extensively used were Black Walnut, Ash, Honey Locust, Red Elm, Ash-leaved Maple, Osage Orange, Catalpa, White Elm, Maple, Cottonwood, and Ailantus.

All the varieties named in the recommended list of the Society are successfully grown here. There are objections to a few in the list, but kindly and judicious management will to a great extent overcome them, except in the Cottonwood, for which substitute the Russian Mulberry. The Cottonwood can be made useful for a few years as nurse trees, and in the construction of wind-breaks, when a rapid growth is desired. But in any event plant it quite a distance from all fruit trees, as, being a voracious feeder, it will soon impoverish the land, and rob its neighbors of what they need.

The following is a preferred list for this county: 1. Black Walnut, 2. Honey Locust, 3. Elm, 4. Ash, 5. Ash-leaved Maple, 6. Willow (on lowlands), 7. Russian Mulberry, 8. Catalpa. This list is well adapted to upland (excepting the Willow) and the lowlands. All make the largest growth on lowlands. Timber culture can be made profitable on either location. Many of our early planters are already deriving benefits from their timber plantations in fuel, fencing, and material for many other uses on a farm.

Land selected for timber lots should be thoroughly and deeply plowed before planting. Plant both seeds and cuttings and young trees as is found best. Cultivate thoroughly each year until the growth shades the land.

Russian Mulberry is a success in this county on most all soils and locations; grows rapidly and fruits early; every way promising; requires close trimming while young.

The conditions of climate and soil are more favorable to plant-growth than formerly. This is attributed to extensive areas of land being brought under cultivation, and extensive planting of trees — fruit and forest — which are followed with an increased rainfall, rendering the land more productive.

From experience and observation it is believed that the entire Western prairie regions will in time be made to produce forest trees in abundance to meet the wants of the settlers thereon.

(*South half.—By J. B. Avery, Clifton.*)

Forest-tree plantations in this county were in good condition at the opening of spring in 1885. The planting of the present season was quite extensive and successful, not to exceed ten per cent. failing. Cottonwood, Ash-leaved Maple, White Ash, Osage Orange, Elm, Catalpa (Western Hardy), Russian Mulberry and White Maple were most commonly used.

The varieties named in the Society's recommended list have generally been successful in this county.

Substitutes: I would use Oaks and Hackberry for the Ash-leaved Maple and White Maple.

I advise planting on the uplands for fuel, fencing and such purposes as wood is needed for on a farm. For such locations use in the order named the following: Cottonwood, Black Walnut, Catalpa (Western Hardy), White Ash, Oaks, Osage Orange, Russian Mulberry, Honey Locust, and Hackberry. For lowlands, the same list is satisfactory.

The Russian Mulberry thrives on all soils, and on clayey soil better than any other variety grown here. It seems to be hardy, but of dwarfish growth. On account of this habit, it has been used principally for wind-breaks and shelter-belts.

All forest trees should receive the same cultivation as that given corn, until their growth will shade the ground and keep weeds and grass checked.

Trees of all kinds are more successfully propagated and transplanted than formerly, owing to improved conditions of soil and climate, brought about principally by preservation of our natural forests, and plantations of artificially-grown forests, and fruit trees, which induces a more uniform rainfall and affords protection from the extreme atmospheric changes.

There is no doubt but that forest trees may be successfully grown throughout the whole State. Cottonwood, Elm, Hackberry, Ash and Ash-leaved Maple are found growing naturally along all the water-courses in the northern tier of counties to the Colorado line, and fine groves of trees are now grown on upland in Decatur county.

WYANDOTTE COUNTY.—By Maj. Frank Holsinger, Rosedale.

(*Eastern portion.*)

This portion of the county was largely covered with natural forests, hence there is no special inducement to plant other than for shade and ornament. The plantings for such purposes were very successful the present season. White Maple, White Elm, Catalpa (Western Hardy), Hard Maple, Poplars and White Birch were generally used, and all seem to do well.

Of the varieties named in the recommended list of the Society, all except Catalpa and Osage Orange are natives of the county. Nature scattered the seed upon the hills and in the valleys, and she provides for their wants. Our Oaks should not be overlooked; they are of quick growth and their timber is valuable. The Wild Cherry and native Mulberry are also rapid growers, and their wood is valuable. I would offer them as substitutes for either of the varieties of the last half of the list recommended by the Society. I would offer the following list for general planting, and in the order named: Black Walnut, Catalpa (Western Hardy), Osage Orange, White Elm, White Ash, White Oak, Burr Oak, Wild Cherry, and Larch.

The hickory is dying out in our forests, owing to severe winters.

Undoubtedly the Western prairies will in proper time produce forest trees in sufficient quantity to supply the wants of settlers thereon.

(*Western portion.—By H. H. Kern, Tiblow.*)

Forest-tree plantations were in a very fair condition at the opening of spring in 1885, and the planting of the present season was generally successful. Ash-leaved Maple, White Maple, White Ash, Elm, Catalpa, Black Walnut, Russian Mulberry and American Chestnut were used. The last succeeds fairly, and yields nuts almost every year.

In place of the order of the arrangement of the recommended list of the Society, I would offer the following: 1. Black Walnut, 2. White Ash, 3. Ash-leaved Maple, 4. Catalpa, 5. Osage Orange, 6. Russian Mulberry, 7. Cottonwood, 8. White Elm, 9. Chestnut (American), 10. Gray Willow.

The Russian Mulberry has been tested both on upland and lowland for the past five years, and has proven to be very thrifty and hardy; it branches rather low down, and makes plenty of fuel. The fruit is almost worthless for eating. Like any other tree, it thrives best on a warm, rich, well-drained loam.

For forest-tree plantations, prepare the ground by deep plowing and thorough harrowing; set the plants in rows, and cultivate thoroughly each year until their growth is ample to shade the ground. The more thorough and constant the culture, the better the results in wood-growth. Mulching will be a benefit while the trees are young; it adds to the formation of leaf-mould, which is essential to success, and which is found in all naturally-formed forests.

For commercial purposes, the Black Walnut is the only variety which will pay to plant on our lowlands.

I believe that the Western prairies can be made to produce forest-tree growth, both for fuel and profit, and am confident trees can there be grown with small expense; as the land is easily cultivated, and trees make a very fair growth when properly attended to, and with very little rain.

CENTRAL DISTRICT.

BARTON COUNTY.—By F. W. Bester, Pawnee Rock.

(*West half.*)

The condition of forest-tree plantations was very good at the opening of spring. Every kind stood the last severe winter well. Planting in the spring was about the same in extent as in previous years. Nearly every farmer planted; failures were very small, not to exceed two per cent. Cottonwood, Catalpa, Ash-leaved Maple, Honey Locust, White Ash, Russian Mulberry, Osage Orange and some few Black Walnut were most extensively used. Varieties most successful were: Cottonwood, Ash-leaved Maple, Honey Locust, Russian Mulberry, Catalpa, and Osage Orange.

Recommended list for bottom land in this county preferred as named: 1. Catalpa, 2. Cottonwood, 3. Ash-leaved Maple, 4. Black Walnut, 5. Russian Mulberry, 6. Osage Orange, 7. Honey Locust, 8. White Ash. On upland: 1. Russian Mulberry, 2. Catalpa, 3. Ash-leaved Maple, 4. Black Walnut, 5. Honey Locust, 6. Cottonwood, 7. White Ash, 8. Osage Orange. Very few White and Red Elm and White Maple planted.

Seed of the Black Walnut are planted where the tree is to stand. Of the others, yearling trees grown in seed-bed are generally preferred. Cottonwood is sometimes grown in beds one year, and then transplanted. Cuttings and seeds are planted where they are to grow into trees. They are generally a failure through neglect.

There are no objections to the varieties in the Society's recommended list, but they should be arranged for upland and bottom-land planting.

Insects: None prevalent except the fall web-worm. Rabbits are troublesome, attacking the young trees, and particularly the Catalpa. As a preventive—also against mice—use a wash made of two-thirds soft soap, one-third pine tar, mix with water till of a consistency like common paint, then add one pound of flour of sulphur to a gallon, boiling it together. The Russian Mulberry should be added to the list for this county, as it and the Catalpa are leading trees.

I do advise planting forest trees on upland, and cultivating often and thoroughly, being careful to keep the land level and all weeds down.

Russian Mulberry is hardy and vigorous, but it has the habit of branching near the ground. If these are kept cut off, it will make a tree of good size, and will stand more drouth than any other sort. When of proper size it may be cut for posts, and it will again form trees by sprouting from the stump. I cannot discover any difference in its success, whether on upland or bottom land, only its growth is a little more vigorous on bottom land.

There has been more rainfall during the past two years than formerly, and planters have discovered the necessity of thorough culture to succeed. I believe that with proper care in growing trees the Western prairies can be made to produce sufficient of forest to meet the wants of the settlers thereon.

(*East half.—By Levi Gunn, Great Bend.*)

Forest-tree plantations were in good condition at the opening of the spring of 1885. Double the number of trees were planted this season of that of any previous year, and were entirely successful. Cottonwood, White Maple, Honey Locust and Ash-leaved Maple were extensively used.

With few exceptions, the varieties recommended in the Society's list have been a success. The Cottonwood does not succeed except when planted on creek and river bottoms. White Ash and White Elm have not given satisfaction. Substitutes: White Maple, in place of White Ash, and Sycamore for Cottonwood.

A recommended list for this county I would arrange in the order of preference, as follows: Honey Locust, Ash-leaved Maple, Osage Orange, Catalpa (Western Hardy), Black Walnut, Red Elm, White Maple, and Sycamore. This list is well adapted to uplands. For lowlands, skirting water-courses, all the varieties named in the Society's list succeed.

Land to be used for the growth of forest trees should be deeply plowed, and as well prepared as for corn. If young trees are to be used, plant in rows, eight feet apart; if seed, sow thickly, thin out to proper distance, and thoroughly cultivate; for unless this is given, disappointment will surely follow.

Insects: Borers attack the White Ash, grasshoppers the Osage Orange this year, and worms the Cottonwood and Ash-leaved Maple.

Russian Mulberry has been tried the past three years, and does best on upland. It killed nearly to the ground the past winter. It is more of a shrub than a tree, and will have to change its form of growth materially to ever become a forest tree.

The conditions of climate and soil are more congenial to forest-tree growth at this time than formerly, owing to an increased rainfall, the soil being more productive by continued cultivation, and the subsoil more mellow, which affords the roots a better chance to run deep.

From nine years' experience in this county, I feel confident that the Western prairies can be made to grow forest trees in sufficient quantity to meet the ordinary wants of the settlers thereon.

CHASE COUNTY.—By J. W. Byram, Cedar Point.

Artificial forest-tree plantations on March 1, 1885, were in good condition, and such as were planted the present season were a success. The Catalpa (Western Hardy), Mulberry — both Russian and native — were principally used.

All the varieties named in the Society's recommended list have been planted excepting the Osage Orange, Ash-leaved Maple, and White Maple, and are successfully grown. The following are the objections to the list: Osage Orange, too thorny; Cottonwood, worthless for timber, and poor fuel; Ash-leaved Maple, slow growth and scrubby, with same objections of the Cottonwood; White Maple, too tender; is badly broken down by winds. Substitutes: For the Osage Orange, use the native Mulberry (*Morus rubra*); for Ash-leaved Maple, the Russian Mulberry (*Morus tartarica*); for White Elm, the Kentucky Coffee Tree. For upland I would use, preferred in the order named, for fence posts, etc., Catalpa, native Mulberry, Russian Mulberry, Kentucky Coffee Tree, Black Walnut, and White Ash. For future timber material and above-ground purposes, Black Walnut, Kentucky Coffee Tree, and Honey Locust. For fuel, any or all of those named. The entire list is well adapted to lowlands.

Russian Mulberry has proven to be both vigorous and hardy, and as promising for a good-sized tree as the Osage Orange; and like it assumes more of the character of the hedge plant. It is desirable for wind-breaks. Our native Mulberry is more promising.

Forest-tree growth has been more successful in this county during the past five years than formerly, but it is probably owing to the seasons being more favorable for all classes of vegetation. Whether there has been a permanent change effected will require more time to determine.

From my observations and experience in this State, I believe that the Western prairies can be made to produce sufficient forest-tree growth to meet the wants of the settlers thereon.

COFFEY COUNTY.—By C. H. Graham, Leroy.

The condition of artificially-planted forest trees was fair in the spring of 1885. About the same extent of planting was made the past spring as in previous years, but was not fully successful. Elms, Hackberry, Cottonwood, Catalpa, Osage Orange and Black Walnut were most extensively used. Catalpa, Osage Orange and Black Walnut were the most successful.

The recommended list of this Society is successful in this county, and needs no changing.

The culture given is about the same required for fruit trees, and is all that is needed.

Insects: None noticed, except a leaf-eating worm on Cottonwood and Maple trees.

This county is well supplied with naturally-grown forests along the river and creek bottoms, therefore no extensive plantations have been made.

The Russian Mulberry has not been extensively used, but is a fair success wherever planted.

Our conditions are more encouraging to a forest-tree growth than formerly. Prairie fires have been checked, the land rendered more fertile, and the seasons are more favorable.

The time is not far distant when the Western prairies will be reclaimed, and forest trees will be easily grown on them at least in extent to meet the wants of settlers thereon.

FRANKLIN COUNTY.—BY JUDSON WILLIAMS, OTTAWA.

(*North half.*)

Artificially-planted forest trees were generally in a good condition at the opening of the spring of 1885, and the planting of varieties recommended by this Society were successful, though not extensive. The White Elm, White Maple, Ash-leaved Maple and Black Walnut were most extensively used.

For uplands, would recommend the following: For fuel, the Peach tree; it can be grown rapidly between rows of Cottonwood or Black Walnut. For posts, the Catalpa and Osage Orange. For timber for mechanical purposes, Black Walnut, White Maple and Honey Locust. For a permanent timber-lot, Black Walnut and Honey Locust, and on poor soils use Hackberry.

For lowlands that are inclined to be wet, plant Pecan, White Elm, Osage Orange and Cottonwood. On well-drained lands, plant Black Walnut, Honey Locust, White Ash, Red Elm, Catalpa, Hackberry, and Ash-leaved Maple.

No list can be made free of all objections. Thus, the Ash is too slow a grower to suit all men, and the White Elm is of little value except for shade; but all have some valuable points which render them desirable. To overcome serious faults we should study them in their natural locations, and where they are found doing well, and try to supply the same conditions in our attempts to artificially grow them; giving them a similar soil and surroundings, and conforming our treatment to Nature's as far as practicable.

The best results are generally obtained by growing from seeds, in rows six feet apart, and four feet in the row. Cultivate thoroughly, and thin out as required.

Substitutes: Hackberry for the White Elm, for any purpose except shade; Pecan for White Ash, for a general planting, and especially on heavy, cold soils.

Insects: The Black Walnut is infested by the fall web-worm, White Maple, the green maple-worm, and the Ash-leaved Maple is subject to the attacks of borers in some localities.

The Russian Mulberry has been tested to some extent, and seems best adapted to our deep fertile soils. The tree is hardy and vigorous so far; is rather spreading in habit, and does not promise to make a tree of good size. It may prove desirable for shelter-belts, and its fruit for birds.

The conditions of climate and soil are more congenial to tree-growth than in former years. The rainfall is more equally distributed, probably due in part to the extensive area brought under culture, the planting of hedges and trees, and the growth of crops; all of which conduces to moisture, the cooling of the earth's surface, and the obstruction of evaporation therefrom.

From observations and experience, I believe that whenever the necessary conditions are complied with, our Western prairies will be reforested.

(*South half.—By Joshua Taylor, Richmond.*)

Forest-tree plantations of all kinds, so far as observed, were in good condition the past spring. The planting of this season was equal to that of previous years, and generally successful. White Maple, Black Walnut, Catalpa and Russian Mulberry were most generally used. No failures to speak of occurred.

All the kinds named in the recommended list of the Society succeed in this county when given reasonable care and culture while young, and until well started. Give them such treatment as ordinary farm crops should have until two or three years old, and they will then thrive with little attention. No particular fault can be found with the list, excepting that some of the varieties are of little value as timber. The Black Walnut, Osage Orange, White Ash, Honey Locust and Catalpa are the most valuable. As substitutes, I prefer our Native Mulberry to the Red Elm. For lowlands I recommend the following, to be valued in the order named, commencing as first: Black Walnut, Shellbark Hickory, Osage Orange, White Maple, Honey Locust, White Ash, Cottonwood, Catalpa, Ash-leaved Maple, Native Mulberry. For uplands, strike out the Elms.

Russian Mulberry: The young trees seem to do well on all soils. I consider it worthy of trial.

The climate is more congenial to forest-tree growth than formerly. We have more rains during summer, and a moister atmosphere during summer and autumn. I believe these changes are due to extensive culture of the land, and to planting and growing of trees, etc.

HARVEY COUNTY.—By M. Hall, Newton.

Trees of all classes were in good condition at the commencement of the present season, and made a healthy growth. The extent of planting this season was equal to that of previous years, and in success exceeded that of any year before. White Maple, Catalpa, Elms, Russian Mulberry and White Ash were most extensively used, and a few of the Cottonwood and Hackberry.

All the varieties named in the Society's recommended list are successfully grown in the county. I would, however, substitute the Russian Mulberry and Hackberry for Cottonwood and Ash-leaved Maple. This would then be the best for our uplands. For lowlands, Cottonwood, Ash-leaved Maple, Gray Willow, Elms, Hackberry, White Ash, Honey Locust, White Maple, Blue Ash, Sycamore and Black Walnut are preferable varieties.

Timber groves should be planted close enough to insure the shading of the ground at the end of the second year. After that they will not require cultivation.

Russian Mulberry: I have it planted on high and low land, and its growth appears to be as good in one as the other location. By proper pruning while young it will make a fine tree. It is preferable to the Osage Orange for hedge purposes.

The conditions of climate and soil are more congenial to plant-growth than formerly. There is an increased rainfall, and a more even distribution. This has been produced by the extensive planting of trees and the opening to tillage of large areas of land. I believe, from observation during a recent trip through the counties of Kingman, Comanche, Edwards, and Clark, that the settlers will be able to grow trees as successfully as we are now doing in this county. They may lose a large portion of their first planting on account of the unprepared condition of the land, but as cultivation increases — rains will follow the plow — they will be more successful.

HODGEMAN COUNTY.—By A. Stevens, Middle Branch.

(*Northeast portion.*)

The condition of forest-tree plantations at the opening of the spring of 1885 was good; trees vigorous and healthy. The planting of this season was successful, though not extensive. Failures did not exceed one per cent. on my farm. Catalpa, Cottonwood, Ash-leaved Maple, Black Walnut and White Maple were most extensively used; the first three are the most successful.

The varieties recommended in the Society's list all succeed in this county, where treated to careful management and clean cultivation.

Russian Mulberry: I would use this in place of Cottonwood, which is too short-lived, and its timber has no value when grown, while the Russian Mulberry is the most vigorous grower of all the sorts on my farm, and evidently is the most valuable kind for this county. It thrives on all soils and locations, but the best on uplands.

Insects: None injurious to forest trees have appeared yet.

I advise planting on uplands, using Honey Locust, Catalpa, Black Walnut, Osage Orange, and Russian Mulberry. For lowlands, the same list will do well.

The conditions of climate and soil have materially changed during the past seven years. I think the cause is the settling and improving of the land, and keeping out the prairie fires. The changes are noticeable in an increased rainfall and humid atmosphere.

From experience, I believe that any settler having perseverance and patience can succeed on our Western prairies in growing trees to meet all his wants. All that is necessary is to get the land under good tillage by plowing, and raising crops, with thorough cultivation, and keeping out prairie fires.

(*Central portion.—By Henry Eberle, Arthur; L. P. Mack, Jetmore; C. T. Purdy, Purdyville.*)

The artificially-planted forest trees were in good order, where well cultivated, at the opening of last spring. The area was largely extended in the northern and central portions of the county, but not in the southern. In the northern and southern portions the failures were fifty per cent., while in the central not more than five per cent. Varieties most extensively used: In the northern — Catalpa, Black Walnut, White Ash, Cottonwood, and Ash-leaved Maple. In the central — Black Walnut, Catalpa, and Cottonwood. In the southern — Cottonwood, Honey Locust, Black Walnut, White Maple, and Ash-leaved Maple.

All the varieties named in the Society's recommended list are successfully grown in the county.

For the central portion the following list is recommended, in the order named: 1. Black Walnut, 2. Cottonwood, 3. Honey Locust, 4. Catalpa, 5. Ash-leaved Maple, 6. White Ash, 7. Osage Orange, 8. White Maple. This list suits both upland and lowland. (The Honey Locust is one of the surest to thrive.)

For the northern and southern portions the Society's list is recommended for both upland and lowland plantations. The Hackberry is a native of this county, and should be added to the list.

Planting and treatment: Seed of the Black Walnut should be planted in the fall; of Ash, Osage Orange, Ash-leaved Maple and Honey Locust in the spring; Cottonwood, White Maple, and Elm, as soon as ripened, in the spring. It is much easier to propagate the Cottonwood by cuttings made in the fall, and kept fresh till spring. No plantation can succeed here unless thoroughly cultivated until the shade of trees covers the land. Mulching is highly beneficial while trees are young.

Insects: None have injured our forest trees yet. Rabbits are very destructive during the winter.

Russian Mulberry: This tree has been planted, and, though young, indicates endurance and vigor.

The conditions of climate and soil are more congenial to the growth of forest trees than formerly. We have an increased humidity of the atmosphere, increased and more evenly-distributed rainfall. This is attributed to the disappearance of the buffalo, which in former years trampled our prairies as hard as a rock-bed, thereby causing all the rainfalls to rapidly run off into the watercourses. The checking of prairie fires and the tillage of extensive fields have been sources conducive to such changes, as by it the earth is enabled to retain the rainfall, and impart it to the growth of vegetation through the roots and the atmosphere.

"Since the disappearance of the buffalo and checking of prairie fires, the grass, becoming a mulch, has softened the ground. Blue-stem has taken the place of buffalo grass. Springs are breaking out where there were none six years ago. Small streams, which only held water in places, have been running streams the past two years. I speak from an experience of eight years in this county."—(L. P. Mack.)

(*South half.—By J. W. Horton, Arthur.*)

The condition of forest-tree plantations was good where well cultivated the year previous, at the opening of spring in 1885. The planting this season did well when corn or potatoes were grown between the rows, and thoroughly cultivated. Cottonwood, Ash, Ash-leaved Maple, Black Walnut, Black Locust, Ailantus, Osage Orange and Silver-leaved Poplar were extensively used; but the Cottonwood, Silver-leaved Poplar, Black Walnut, Honey Locust, Red Elm and White Elm were most successfully grown. The Black Walnut is a sure but slow grower. Trees four years old only measure three and a half feet in height. White Ash is a slow grower, but hardy. The seed is not easily germinated. Trees three years old measure only two feet in height. White Elm is a native of this county, and can be grown from cuttings. Trees four years old measure seven feet in height. Osage Orange succeeds whenever good seed is used. Cottonwood is successful on both upland and lowland, where the land is wet, or mixed with coarse red sand. Trees four years old measure eighteen feet in height. The White Ash does not stand drouth while young. I would use Silver-leaved Poplar as a substitute.

After five years' experience in this county, I would not hesitate to plant the following list: Black Walnut, Catalpa, Russian Mulberry, Hard Maple, White Maple, Honey Locust, Red Elm, White Elm, Cottonwood, Kentucky Coffee Tree, Ailantus, Silver-leaved Poplar, Wild Cherry, Osage Orange, Red Cedar, Quaking Asp, Sycamore, Black Willow, Yellow Willow.

Planting and treatment: Plant seeds or cuttings in rows eight feet apart, and quite thickly in the row. After the first years, or when the growth requires, thin out or transplant from the row so as to leave them only four or five feet apart in the row. Plant a row of corn in the spaces between rows, and keep the ground well stirred with a double-shovel plow. Each spring plow deep between the rows. Always leave the earth in basin form around the trees.

Insects: Very few have attacked forest trees. There are two kinds of leaf-eaters, and a species of borers attack trees which have become injured near the ground, and a fly which injured the tender growth.

I advise planting forest and other trees on our uplands. Such locations are more desirable than lowlands. I would plant Peach trees, Cottonwood, Silver-leaved Poplar, Willow, Elm, and Tame Cherry. I have Tame Cherry Trees three years old which measure three to four inches in diameter, and six to eleven feet high. They fruit well, and the bodies make good stove-wood. I would plant the above list in the order named.

The main trouble in this county is the lack of improvements by breaking up the land, and planting more groves; each quarter-section should have from ten to twenty acres in trees.

Land in this county requires stirring at once after each rain, and this should not be delayed until the soil is dry, as then it becomes very hard.

JOHNSON COUNTY.—By Henry Rhoades, Gardner.

The condition of artificially-planted forest trees was good at the beginning of the last spring, and the plantings of the present season were generally a success.

The varieties named in the Society's recommended list are most successful, and I can see no reason for changing any or offering substitutes. The Cottonwood will die out when planted thickly.

For uplands and lowlands, I would use as preferred in the order named: Osage

Orange, Red Elm, White Ash, White Maple, Black Walnut, and Hackberry. All plantations should receive good cultivation until the trees are large enough to shade the ground.

The conditions of climate and soil are more congenial to plant-growth than formerly, and from observation and experience in our State, I believe that the Western prairies can be made to produce sufficient forest trees to supply the wants of settlers thereon.

LANE COUNTY.—By Charles P. Slocum, Farnsworth.

This county is of too recent settlement to furnish the information asked. The lands have mostly been settled on within the past six months, hence very few trees have been planted. I am of the opinion that these buffalo-grass plains lying west of the one-hundredth meridian can never be made to grow forest trees profitably unless by the aid of irrigation. Lack of moisture will be the main hindrance. There is a settler on every section especially interested in the forestry question, and if these settlers fully comply with the timber-culture act of Congress there will be some experiences to record in the near future.

I am not a cattle-man, but a "granger."

LINN COUNTY.—By J. W. Latimer, Pleasanton.

There is but little done in this county in the line of forest-tree planting except for ornament and orchard-shelters; but so far such efforts have been successful. The Catalpa has been extensively used. The Russian Mulberry is gaining in public favor where cultivated when young.

All of the varieties named in the Society's recommended list are natives of this county, excepting the Osage Orange and Catalpa, and are successfully grown. Substitutes: Red Cedar for Catalpa, and Russian Mulberry for Cottonwood. Objections: Some of the list have none, or a very small, money value, such as the White Elm, Cottonwood, Ash-leaved Maple, and White Maple. These should not be encouraged as a paying investment for their wood.

As a recommended list I offer the following-named in the order of merit: Catalpa, Red Cedar, Black Walnut, Honey Locust, Osage Orange, Russian Mulberry, Ash, Bur Oak, Red Elm, Cottonwood, White Maple, Hard (Sugar) Maple, White Elm, and Ash-leaved Maple. The last four, only for ornamental trees, should have good soil and culture.

Yes, I would advise planting on upland where fuel is scarce and hard to obtain; and for such would use Lombardy Poplar, Peach, White Maple, Ash, Catalpa, Red Cedar and White Willow as making the most wood in a short time.

For lowlands, use the above, excepting the White Maple, and add Black Walnut, Honey Locust, and Russian Mulberry. The last named is hardy and vigorous where well cultivated, but poor under neglect; it thrives best planted on rich land.

Insects: After trees are well established they are not troubled, excepting the White Maple, which is some years defoliated by the maple-worm.

Our climate is unquestionably changing. It is becoming more humid, and the drying, hot winds so detrimental to plant-life are quite occurrences of the past.

The Western prairies are rapidly changing by the hands of settlers, and conditions are becoming more favorable to the growth of all classes of vegetation. In time, I believe that forest trees will be grown sufficiently to meet the wants of the settlers of those regions.

LYON COUNTY.—By J. M. Perkins, Emporia.

Artificially-planted forest trees were in a healthy condition when last spring opened. The planting of the present year was very successful, though not extensive. The failures did not exceed 5 per cent. The Catalpa (Western Hardy), Black Walnut and White Maple were most extensively used.

The kinds named in the Society's recommended list are all grown successfully in this county, and I can see no reason for changing in any respect, but would add Pecan, Shellbark Hickory, and Persimmon.

I would advise planting on upland, and the following list is recommended for such locations: Catalpa, Black Walnut, Osage Orange, Cottonwood, Ash-leaved Maple, and White Maple. For lowlands, the Society's list is well adapted. Success in forest-tree plantations depends largely on good and constant cultivation.

Insects: Black Walnut is attacked by a tent caterpillar; White Maple, by a large green worm, which completely defoliates it. For the first, burn them when gathered in their tent-covering with a torch. I know of no effectual remedy for the destruction of the other.

Russian Mulberry has been planted in the county on low, heavy soil, and is hardy and vigorous. It grows low and bushy, and does not promise to make a tree of good size.

I think the conditions of our soil and climate are more congenial to forest-tree culture than formerly, especially as there is an increased rainfall.

I have no doubt but that in time the Western prairies will produce sufficient forest trees to meet the wants of settlers thereon.

MARION COUNTY.—By J. B. Dobbs, Antelope.

(*North half.*)

Forest-tree plantations were in a good condition at the opening of the last spring. The present year's planting, though not extensive, was fully successful, and was made largely of Cottonwood and Catalpa.

The following list, arranged in the order of comparative merit, is recommended to the planters of this county: 1. Teas's Hybrid Catalpa, 2. Western Hardy Catalpa, 3. Black Walnut, 4. Cottonwood, 5. Osage Orange, 6. Black Locust, 7. White Ash, 8. Red Elm, 9. Kentucky Coffee Tree, 10. White Maple. I would not advise planting on the upland.

Insects: A worm infests the Black Walnut, and borers the White Ash.

All forest-tree plantations require thorough cultivation to be fully successful, and if the rows are sufficiently apart, corn may be grown between with advantage to the trees, and a gain to the planter.

Russian Mulberry has been tried, and proven to be hardy and vigorous. Its spreading habit is the main objection as a timber tree. It may improve in this respect if planted thick—as rows four feet apart and trees only two feet in the row, which would have a tendency to suppress lateral branching, and push a more upright growth. It will grow on most any land, but thrives best on sandy lowlands.

The conditions of climate and soil are more favorable to tree-growth than twenty years ago. We have an increased rainfall, and less high winds. The increased humidity is attributed to a change in the character of the surface of the country. When the buffalo covered these prairies, the ground was hard and grass short; rains rapidly ran off, and the earth baked hard. ' Streams, which used to dry up, have yielded an unfailing supply of water the past fifteen years. As the buffalo left, bunch grass covered the prairies, followed by the blue-stem. Ten acres of blue-stem will hold more water than 100 acres of buffalo grass, and one acre of plowed land will take up and retain more rain than ten acres of prairie-grass land. These changes create springs and streams, hence we have an increased humidity, and consequently a better plant-growth.

I am fully satisfied that the Western prairies can be made to supply the settlers thereon with all the wood they need for fuel and other purposes, except building material.

(*South half.—By Eugene F. Barnes, Marion.*)

Forest-tree plantations in this county were in good condition at the opening of the spring of 1885. Planting the present season was not extensive, but generally a success. Some young trees failed from an excess of rainfall. The Catalpa (Western Hardy), Cottonwood, Black Walnut and White Maple were mostly used; the first three named were most successfully grown.

I would offer the following list, arranged in the order of preference, on account of their adaptation to the soils in this county and climate: Catalpa (Western Hardy), Black Walnut, Osage Orange, Cottonwood, Red Elm, Black Locust, and Ash-leaved Maple.

The Russian Mulberry is successfully grown on our uplands, and I believe should be added to the list as desirable.

The Black Walnut and Catalpa have the objection of slow growth under ordinary treatment; but I believe this can be overcome by special care and cultivation.

I advise planting forest trees on uplands, for fuel, fencing, etc., and for such locations prefer Catalpa (Western Hardy), Black Locust, and Osage Orange. For lowlands, Black Walnut, Cottonwood, and Osage Orange. For planting, I recommend the using of seed of Black Walnut and White Maple, cuttings of the Cottonwood, and young trees of the others. All plantations should be given frequent cultivation.

The conditions of soil and climate are more favorable to growth of forest trees than formerly; the changes observed are: first, an increased rainfall; second, fewer occurrences of hot south winds. These, in my opinion, are caused by the large area of land brought under cultivation, and more extensive planting and growing of forest trees.

Experience has proven that forest trees in small lots can be and are grown successfully on the Western prairies, and I believe with the same care and treatment large plantations can be made equally successful.

McPHERSON COUNTY.—By Geo. Olivant, Conway.

(*North half.*)

All forest-tree plantations were in good condition at the opening of spring in 1885. Plantings in 1885 were about equal in extent to that of previous years, and very few failures occurred. Cottonwood, Ash-leaved Maple, Black Walnut and Catalpa (Western Hardy) were generally used.

All the varieties named in the Society's recommended list are successfully grown in this county. Objections: The Black Walnut is a slow grower when planted by itself. To remedy this fault, plant it in alternate rows with the Cottonwood, which will encourage its upward growth.

I would recommend the following list for this county, arranged in the order of their merit from the experience of practical forest-tree growers: 1. Black Walnut, 2. White Locust (Thornless Honey Locust), 3. Catalpa (Western Hardy), 4. Ash-leaved Maple, 5. Cottonwood, 6. Osage Orange, 7. White Maple, 8. Honey Locust, 9. Red Elm, 10. White Ash, 11. White Elm, 12. Hackberry. While the growth of timber is rather slow on uplands, every farm has a small amount of land in some draw or low spot which should be utilized for the purpose of raising timber for fuel, at least. The White Locust, Cottonwood, Black Walnut, Russian Mulberry, Ash-leaved Maple, Osage Orange and Red Elm are well adapted to such locations. For our lowlands, all of the varieties succeed, but their value, comparatively, is as follows: Black Walnut, White Locust, Ash-leaved Maple, Catalpa, Cottonwood, Honey Locust, Red Elm, White Ash, White Elm, Hackberry, and Oaks.

Insects: Borers attack the White Ash, White Elm, and Ash-leaved Maple, but not to any great extent.

The White Locust above recommended was first introduced into this country twelve years ago, the seed having been obtained in Canada; has been very successful; some specimens now measure ten to twelve inches in diameter and twenty-five to thirty feet in height; does best on sandy loam.

Thorough culture should be given all forest-tree plantations. Slow growers should be planted between rows of rapid and upright growers, to induce an upward growth and prevent the developing of lower branches. Such treatment gives a straighter form to their bodies.

The Russian Mulberry was introduced into this country several years ago by the Mennonites with good results. It promises to make a good-sized tree; needs more pruning than other kinds. Such of them as do not make a thrifty growth should be cut down to the ground, which will induce a strong growing sprout to start up and form a straight body for the future tree. It makes good growth on upland, but better on bottom or sandy land.

Our climate has undergone a change, and is more favorable to tree-growth. Hot winds are not as frequent as formerly. In time, I believe the Western prairies will become favorable to the growth of trees, and plenty will be raised for the use of the settlers thereon.

(*South half.—By Theo. Boggs, McPherson.*)

The condition of forest-tree plantations was generally good at the opening of the spring of 1885. The planting of the present year equaled in extent that of previous years, and was almost universally a success, on account of the abundance of rain. Not exceeding ten per cent. failed. White Maple, Black Locust, Red Elm, Catalpa, Black Walnut, Cottonwood, Ash-leaved Maple and Honey Locust were generally used. All did well.

The varieties of the recommended list of the Society, without exception, succeed in this county. Substitutes: The Black Locust for either Ash or Elm. It is a fine grower, makes durable wood, and so far has escaped injury by borers.

I offer the following list, named in the order of merit, as determined by the experience of practical forest-tree growers in this county: Black Walnut, Catalpa, Black Locust, Honey Locust, Osage Orange, Ash, Elm, Ash-leaved Maple, Cottonwood, and Ailantus.

I would advise planting on uplands as profitable for fuel, fencing, and other purposes where wood is needed on a farm, of the varieties and in the order as named in the above list. For lowlands, plant only Black Walnut, Cottonwood, Honey Locust, Black Locust, and Ash-leaved Maple.

Plant the seed of Black Walnut where the tree is to grow. Of all others, plant seed in nursery rows, and transplant when one, two and three years old. Of the Cottonwood use cuttings. All forest trees should be set in rows eight feet apart, and four feet in the row. Cultivate thoroughly during the first seven or eight years, and keep the lower branches pruned off. Especially should the outside rows on the southwest and west be well mulched with straw to keep the grass subdued. This treatment most especially should be given the Cottonwood and Ash-leaved Maple, for if allowed to grow in grass and weeds they are liable to die out in hot, dry weather.

The Russian Mulberry does best on rich soil, not too rolling. It is hardy, and will make a good-sized tree.

Insects: A large green worm defoliates the Ash badly some seasons, and the only remedy tried is to catch and kill them. Fall web-worms injure all kinds of trees, but not seriously.

The condition of climate and soil has materially changed, and become more favorable to the growth of trees. Rains are much more abundant, and more frequent. This we attribute to the growing trees, which have been planted since the opening up of the county to settlement.

There is no doubt in my mind as to the success of forest trees on the Western plains; having watched this matter closely during the last eight years, and had an extensive experience in tree-planting and culture during the time.

MIAMI COUNTY.—By L. Bishop, Osawatomie.

The condition of artificially-planted forest trees was good in the spring of 1885, and such as were planted during this season on lawns or in groves were entirely successful. The Catalpa, Hard Maple, Ash-leaved Maple and White Elm were most generally planted.

The varieties named in the recommended list of the Society have been planted, and all are successfully grown. I would plant the Sycamore in place of the Cottonwood. I would suggest the rearrangement of the recommended list in the following order as warranted by success and comparative merits of each: 1. Catalpa, 2. Black Walnut, 3. White Elm, 4. Osage Orange, 5. Honey Locust, 6. Red Elm, 7. Kentucky Coffee Tree, 8. White Maple, 9. White Elm, 10. Ash-leaved Maple. These all do well on upland, and I can see no reason why they will not on lowlands, or even better.

Planting and treatment: For plantations I prefer to use one or two-year-old trees of all classes excepting the Black Walnut, of which the nuts should be used, and planted in autumn where the tree is to grow. Good culture should be given through the first three years, to secure a vigorous condition. To make nice timber, the trees will require pruning from time to time, but not too much at one time. Especially is this necessary for the Catalpa, as the lower branches will die from shade and will not rot off as other varieties may. Groves of Cedar and Pine should be treated in the same manner.

Insects: None have been very injurious. Some years ago the maple worm attacked the White Maple, and recently the fall web-worm was found on the Black Walnut.

Russian Mulberry: This tree has been quite recently planted in this county. It grows quite satisfactorily, and endured the past winter without injury. It does well on uplands.

MEADE COUNTY.—By James A. Linn, Meade Center.

This county has been very recently settled, and consequently forest trees have not been extensively planted, nor have such been sufficiently tried to determine a reliable guide to a future work. But such as were planted the present year, viz., Cottonwood, (Black Walnut on bottoms,) Maple and Osage Orange, were successful in their growth.

Russian Mulberry: Of this only seeds were planted last spring, which resulted satisfactorily generally.

I think there is ample evidence that our climate is undergoing a change which will result in a more favorable condition to plant-growth, and that in time these Western prairies will be made to yield forest trees in abundance to meet the wants of the settlers.

MORRIS COUNTY.—By F. B. Harris, White City.

(North half.)

The condition of forest-tree plantations was very good at the opening of spring in 1885. The severe winter had only killed the tips of branches of the Mulberry. Since the planting by timber claimants under the Government provisions ceased, three years ago, very little has been done in forest-tree planting.

Our past two seasons have been very favorable to the growth of young timber of all kinds. Cottonwood and White Maple have been most extensively grown; the first has been most successful.

All the varieties in the Society's recommended list are used as forest trees, excepting the Osage Orange, and all are reasonably successful, excepting the Cottonwood and Ash-leaved Maple, which have been damaged by the borer. Fires, in several instances, through the carelessness of railroads, have done the most damage.

The Maples and Cottonwood are most liable to the attacks of insects, hence need special care; but they are the most rapid growers, and will soon return a profit for all the attention given them. Careful work in planting and constant and thorough cultivation will overcome all faults of the varieties named.

Insects: Tent caterpillars attack Black Walnut, Ash, and Elm; borers the Maples. The first is not seriously damaging. Thorough cultivation will drown the borers; also enable trees to resist sun-scald.

I do not advise the use of uplands, where the planter has lowlands, for timber plantations. What is called "second bottom" has given me the greatest satisfaction. On such lands, I believe, at the end of twenty-five years, the profit side of the account would make a better showing than if planted to wheat for the same time. Black Walnut and Elms do best on uplands, after once started.

The conditions of climate and soil are more congenial to forest-tree growing than formerly. Bringing the prairie under cultivation helps to hold the rains in the upper soil, which evaporate, and produce a moist atmosphere, dews, and more frequent rainfalls. Again, the tilling of land and other improvements have prevented fires from sweeping over the face of the country and destroying vegetation, which serves as a mulch to prevent the earth from cracking open in seams, through which much of the rainfall descends to the lower strata of earth, and is lost. I find forest and fruit trees do better in starting than they did ten years ago. I have my farm (high prairie) well covered with hedges, forests and fruit trees, and among these the ground is more moist, and they benefit each other by the protection they afford.

It is only a matter of time when the Western prairies will be made to produce timber sufficient to meet the wants of man settled in those regions.

(*South half.—By Crawford Kear, Council Grove, and S. McCullough, Grand View.*)

The condition of forest-tree plantations was very good at the opening of spring in 1885. The planting this season was more extensive than in previous years, which was unusually successful. "Arbor Day" was observed in a great many localities and school districts. Catalpa and Russian Mulberry were most generally used. Cottonwood was not so generally used as formerly.

"The recommended list of the Society succeed in this portion of the county, excepting the Cottonwood and Ash-leaved Maple (Box Elder), and will make a forest if properly attended to. The Cottonwood is least valuable of any, probably short-lived. This and the Ash-leaved Maple suffer great injury, and are often killed by flat-headed borers when planted on uplands. The same may be said of the White Elm. Substitutes: Russian Mulberry for the Ash-leaved Maple, Cottonwood, and White Elm. I approve the Society's recommended list, rejecting the Cottonwood except when used for a quickly-grown wind-break."—(S. McCullough.)

"I offer as a recommended list, for merit in the order of preference: Catalpa (Western Hardy), Russian Mulberry, White Ash, Black Walnut, Osage Orange, Red Elm, White Maple. This list is for upland and lowland."—(C. Kear.)

Plant on the uplands for any and every purpose, if you would plant in any location. It is no longer a question as to whether trees will grow on uplands. They will make almost if not fully as much growth as when planted on the bottoms in this section, excepting the Cottonwood, whose home is on the bottoms skirting the watercourses.

All forest trees should be given thorough cultivation as for corn. Manuring and mulching on thin soils is essential to obtain the best results.

Russian Mulberry: The tree appears hardy and vigorous; is inclined to branch near the ground, but with pruning will make a fine tree. Its fruit is desirable. It thrives best on a rich, well-drained soil.

The climate and soil are more congenial to forest-tree growth than formerly. There is more moisture in the atmosphere; rains are more frequent; dews are heavier throughout the growing season. These appear to increase more and more as the country becomes more subdued. Such favorable conditions have evidently resulted from the industry of our settlers—breaking up and tilling a large breadth of land, which absorbs and holds the rains to be slowly evaporated into the atmosphere, instead of rushing off the land as fast as falling; the planting of timber-groves and belts, orchards and hedges, all of which check the constant blowing of drying winds across the land.

Most assuredly will the Plains yet be covered with forest-tree belts and groves, fields of grain and grasses. Wherever a soil and climate produce a sod and a healthy, vigorous growth of grass of any species, sufficient timber can be grown to meet the wants of settlers thereon.

NESS COUNTY.—BY GEO. F. JOHNSON, FORRESTER.

Forest-tree plantations were in a good condition at the opening of spring in 1885. The planting of the last spring was extensive, and generally successful. The varieties largely used were the Cottonwood, Ash-leaved Maple, Black Walnut, and Honey Locust.

I believe that all of the varieties named in the Society's recommended list can be safely planted in this county.

The treatment given such as have been planted is that required by the timber-culture act of Congress, and is such as should be given to corn. The better the care and culture, the better the results. I give deep and thorough cultivation. Take all cuttings fresh from the trees, in March; guard against any injury by drying; make them about one foot long, and tie in bundles, with top ends together; bury them about six inches deep, in very wet land, and allow them to sprout before planting. During a favorable spell of weather, just after a rain, is best; set them with a spade, by crowding it down to the solid earth, which should not be less than the depth of the spade blade; press the handle forward, to open a hole beneath, into which insert the cutting to the solid ground; carefully then withdraw the spade, and with the foot press the earth onto the cutting firmly. If the planting is faithfully done, and the cuttings are all right, they will grow.

The Russian Mulberry has not been planted to any extent in this county, but so far as tried, I believe it will succeed.

I advise farmers to plant on upland or lowland, knowing that they will succeed if they do their duty.

Insects: I know of none troublesome to forest trees in this county.

The climate has certainly changed to more favorable conditions for plant-growth, and I think it has been caused by settlement and cultivation of the land, and other influences following a civilized people. Land certainly improves by culture, and becomes better adapted to plant-growth by use. Like the Indian, our climate and soil were wild, and needed the beneficent influences of civilization to cause them to respond to the hand of the husbandman.

I certainly do believe that the Western prairies can and will be reclaimed, and will be made to respond to the efforts of settlers thereon, in the growth of forest trees. What one man can do, and has done, can be done by the many. I have now thriftily growing on my farm in this county, eight thousand Cottonwood trees, which are three and four years old. My neighbors have followed my methods, and are equally as successful. What has been done in this county, can be done on the more western prairies, if carefully and intelligently managed.

OSAGE COUNTY.—BY H. DUBOIS, BURLINGAME, AND H. L. FERRIS, OSAGE CITY.

The condition of forest-tree plantations was good in the spring of 1885. Such as were planted the present season made a satisfactory growth, few failures occurring. The extent of planting was equal to that in any preceding year. Catalpa, Black Walnut, Red Elm, White Elm, Cottonwood and Ash were principally used.

The varieties named in the recommended list of the Society are grown successfully in this county, and while some of them have objections, which may be to some extent overcome by judicious treatment, no substitutes are known which can safely be offered. The slow growth of the Black Walnut in some localities could be remedied by increasing the fertility of the land; the irregular form which the Catalpa sometimes inclines to assume could be restrained by checking the growth of side branches, or by planting closely in rows; and this method will also remedy the Osage Orange, causing each to make more of an upright form.

It will pay to plant on the uplands. Use the rapid growers, as the Cottonwood and White Maple, as nurse trees, alternating with the more valuable sorts, and when they interfere, cut them out for fuel.

Planting and treatment: Plant Black Walnut seed, two in a place, in rows seven feet apart each way. Grow the others in nursery, and transplant at one year old, to rows four feet apart, excepting the Osage Orange, which does best in rows as above, but one foot apart in the row. The Cottonwood is easily grown from cuttings. Give good cultivation as long as the spaces will permit.

Insects: The tent caterpillar and borers are injurious, some years. The first are easily destroyed by the thrusting of a torch into their nests, or removing the nest when they are gathered into it, with a forked stick. The other can be prevented by a good cultivation, which will keep up a vigorous growth in the trees.

Seasons are becoming more favorable to tree-growth. Rains are more frequent, and the summer drouths are lessened. Evidently the Western prairies will in time produce a sufficient forest-tree growth to supply the wants of settlers thereon.

PAWNEE COUNTY.—BY C. C. CHEVALIER, GARFIELD.

(Eastern portion.)

Forest-tree plantations were in good condition at the opening of spring in 1885. The present year's planting was not as extensive as in years past, but successful. Cottonwood and Honey Locust were generally used. The Black Walnut heretofore has not been altogether successful; but it has made a good growth the present season, as also the Cottonwood, Ash, Osage Orange, Honey Locust, Elm, and Maple. I would specially recommend for lowlands, Cottonwood, Ailantus, and Ash-leaved Maple. Uplands are better adapted to fruit trees than to forests.

Insects: None are prevalent among forest trees in this locality.

Conditions of climate and soil are more favorable than formerly for forest-tree growth; rains are more frequent, and that is what is most needed.

I believe in time that the Western prairies will produce an abundance of wood from the efforts of the settlers in planting forest trees in that region.

(Western portion.—By W. J. Colvin, Larned.)

At the opening of the spring in 1885, a good many Cottonwoods and some of the young trees of Catalpa and Black Walnut were dead, apparently killed by the severity of the past winter. Planting of the present season was two or three times greater in extent than that of any former year, and all varieties were more successful; only a small per cent. failed. Black Walnut, Catalpa, Cottonwood, Honey Locust and Russian Mulberry have been most commonly used. Objections: The Black Walnut is a slow grower, and the Cottonwood fails when planted on upland, too thick in the row, and neglected in cultivation. It is only valuable for wind-breaks.

I advise planting trees on any kind of land, and if bottom land is not available, plant on upland, of almost any of the varieties mentioned, except Cottonwood and Maple. All timber trees do best on lowlands.

Planting: I prefer planting seed of Black Walnut in fall or early winter, to insure a growth the following season. I do not give them much cultivation the first year; they are apt to sun-scald unless corn is grown among them. Cottonwood trees do the best planted alone and thoroughly cultivated. I am pleased with the White and Red Elm.

Trimming: Very little is required, and should not be practiced until the trees are sufficiently large to afford a self-protecting shade.

Russian Mulberry: This tree has not been extensively tried until the past season. It is successful so far.

The climate has materially changed for the better, and when the soil has been tilled for a number of years, it produces a better tree-growth than the newer land.

I believe that, in fifteen or twenty years hence, we will see a well-timbered country in western Kansas, and each farm will be supplied with timber of its own production. Whenever I travel through the country now, I can see small forests and wind-breaks in every direction, and the people are becoming convinced that good timber can be plentifully grown on many of our soils. Tree planting will annually increase.

RENO COUNTY.—By J. J. Measer, Hutchinson.

Artificially-planted forests were in very good condition when the last spring opened, and such as were planted the present season have been a success. The Cottonwood, Maples, Catalpa, Russian Mulberry, Black Locust, Ash-leaved Maple and Elms were principally used.

The varieties named in the recommended list of the Society are successfully grown in the county, and I would not make any other changes than to substitute the Black Locust for the Cottonwood, and recommend the Russian Mulberry for screens and shelters. The Cottonwood is too short-lived upon our prairies. All forest-tree plantations must receive thorough cultivation, to give the best results.

Insects: The Cottonwood beetle was prevalent, and I know of no remedy.

Russian Mulberry has been planted, and proved hardy with me. It does well on all soils.

The conditions of climate are more favorable to plant-growth than formerly. The atmosphere is more moist, and rainfalls more abundant and frequent. I am satisfied that if the settlers on our Western prairies will plant and care for intelligently, an ample forest-tree growth can be produced to supply all their wants for fuel and fencing.

RICE COUNTY.—By G. Bohrer, M.D., Chase.

(North half.)

Forest-tree plantations in this portion of the county were in good condition at the opening of spring in 1885. The planting the present season was extensive compared with that of previous years, and successful. The Black Walnut, Catalpa, Ash-leaved Maple, White Maple and Cottonwood were most commonly used.

All varieties named in the Society's recommended list are successfully grown here. The Cottonwood should be planted on lowlands, as it does not stand dry seasons on uplands as well as some other varieties. All varieties should be planted not less than six feet apart each way to secure erect growth; if not, they will form low, spreading heads. I cannot at the present time offer any substitutes. The list as it now stands is well adapted to both upland and lowland, excepting the Cottonwood, which should not be extensively planted on uplands.

The Russian Mulberry has been tried, and as a rule has proven quite hardy. Last winter, for the first time, young trees were damaged by the tips of branches being killed in some cases. If planted six feet apart each way, it will I think make a fair-sized tree. It seems to thrive on any soil, if fairly treated.

Uplands to be used for plantations should be thoroughly prepared, by at least twice plowing before planting. I would plant in belt form, in rows, six feet apart each way, and on the north and south sides of the farm when practicable. All forest trees should be well cultivated until their growth will shade the ground.

Yes; the conditions of climate and soil are more favorable to forest-tree growth than formerly. They grow with greater rapidity than eight or ten years ago. This is owing to a moister atmosphere and the retention of rainfall, which is absorbed by tilled land, and which previously ran off the land into natural watercourses.

Whenever a large portion of the more western prairies shall have been broken and put in tilth, so as to retain the rainfall, vegetables of all kinds of the hardy class will be successfully produced, and among these forest trees will hold their place, and supply the settlers of those regions with wood for fuel, fencing, and other purposes for which wood is needed on a farm.

RUSH COUNTY.—By Dr. W. M. Goodwin, La Crosse.

The condition of artificially-planted forest trees at the beginning of the last spring was good, and such as were planted the present season were successful. Honey Locust, Russian Mulberry and Cottonwood were principally used, and when properly planted and cultivated all varieties were a complete success.

In the Society's recommended list, I would substitute the Hackberry for all but the Black Walnut, Honey Locust, and Red Elm. The Catalpa and Osage Orange are liable to be killed back in the small branches. These do best if cut back to the ground when two or three years old.

I advise planting on uplands, as trees do better than on the lowlands, and for such locations would use the following, preferred in the order named: Honey Locust, Russian Mulberry, Black Walnut, Hackberry, White Ash, Black Locust, Osage Orange, Catalpa, Cottonwood, and Ash-leaved Maple.

Russian Mulberry seems to be hardy, makes a vigorous growth, and when cut back on the second or third year forms a strong stem, which promises to make a good-sized tree. It thrives on all kinds of locations excepting our lowlands. The native variety grows better than this variety.

Land for trees should be prepared by deep plowing before planting, and thorough cultivation given the trees each year, being careful not to work the ground when wet or immediately after a rain. It is important in cultivation to so work as to leave the ground lowest near the trees.

The conditions of climate and soil have materially changed since the first settlement in this county, only four years ago. Scarcely any moisture could be found in the land below two or three feet, but now it penetrates to a depth of eight to fifteen feet, and there is an increased moisture of the atmosphere. Space will not permit a full explanation of what are believed to be the causes of such changes. But they can be stated in a general way, viz.: The settlement of the country, and the supplanting of buffalo grass by the stronger and more protecting species.

I am fully convinced that the Western prairies can be made to produce any kind of crops adapted to the climate, and forest-tree growing will be a success.

STAFFORD COUNTY.—BY NELSON NICKERSON, SANDAGO.

(*North half.*)

Forest-tree plantations were in a good condition at the opening of spring in 1885, and the planting for the present year was fifty per cent. greater than that of any previous year; was very successful, not to exceed ten per cent. failing. The leading varieties, and of which the main planting was composed, were Cottonwood and Catalpa (Western Hardy); but Honey Locust, White Maple, Osage Orange, Ash-leaved Maple and Black Walnut were successfully grown. The Cottonwood is the most rapid grower, and every farmer should plant a grove of it for an early supply of wood, and while the other sorts are growing.

I advise planting on *uplands*, and of the following varieties: Catalpa, Black Walnut, White Maple, and Cottonwood. For lowlands, White Ash, White Elm, Red Elm, White Maple, Linden (Basswood), and Gray Willow. Plant the most rapid growers first, and others next.

Russian Mulberry has been planted in this county, on sandy soil, but of recent date; would not feel justified in making any report as to its character yet.

Planting and cultivation: All forest trees and seeds should be planted in listed rows; seed of the Black Walnut in the fall, and in place where they are to form the future tree. If seeds of others are to be used, plant in nursery form, and grow one year; then transplant. The young plants growing from seed do much the best when partially shaded during the middle of the day. I prefer to use one-year-old trees. Set them in rows four feet by eight, and cultivate each year as for corn, until the falling leaves become a mulch on the land.

In cultivating, be careful not to form a ridge against the row, but aim to leave the ground a little lower about the trees than the general surface, to collect and retain the rains.

Insects: Have not discovered any injuring forest trees in this county.

Climate and soil have undoubtedly become more favorable to forest-tree growth than formerly, by an increased rainfall, which has been caused by breaking up of a large amount of the prairie sod, and its tillage, and the planting of timber groves and shelter-belts; and I believe that a continuation of this work will in time cause all of our prairie lands to respond to the efforts of the settlers on the more western plains, with timber growth sufficient to meet all demands for wood on a farm.

(*Central portion.—By J. B. Smith, St. John.*)

Artificial forests were in a good condition wherever they had been well cultivated the previous years. The present season's planting was successful, and in extent equal to that of any previous year. The Cottonwood and Catalpa were principally used.

All the varieties named in the recommended list of the Society have been planted, and succeed. Such culture as is required to produce a good crop of corn should be given forest-tree plantations, but continued later in the season. I would not advise planting on the uplands.

Insects: None excepting a green worm upon the leaves of the Cottonwood.

Russian Mulberry has been planted on sandy land; is hardy, but not vigorous or desirable.

Our climate has become more favorable to plant-growth owing to an increased rainfall, which renders the soil more productive.

I do most heartily believe that the Western prairies will in time produce ample wood-growth to meet the wants of the settlers.

(*South half.—By C. G. McNeil, Stafford, and Isaac B. Werner, Emerson.*)

The condition of forest-tree plantations in this part of the county was very good at the opening of spring in 1885. They appeared healthy and promising a strong growth for the present season. The planting of last spring was more extensive than in previous years, owing to an abundant rainfall, care in planting, and cultivation. The failures did not exceed 5 per cent. Cottonwood, Catalpa and Ash-leaved Maple were most commonly used.

The varieties found in the Society's recommended list have been successfully grown here. But in this windy country all trees are inclined to form low down and become scrubby unless planted very thickly together. Some of the list are slow growers, as the Black Walnut. All such should be given the richest land and special cultivation; and it is desirable to grow them in alternate rows with the rapid and upright varieties, which will encourage a straight, upward growth. The Russian Mulberry would make a good substitute for Osage Orange. It is a hardy, thrifty, and fruitful tree; wood is tough, clean, and durable.

Planting has been done on upland, medium situations, and lowlands, but the trees are most too young to afford any safe conclusion as to the future results.

"I would advise planting on upland as well as lowland, as profitable for fuel, fencing and other purposes where wood is needed on a farm. For upland use Black Walnut, Russian Mulberry, Catalpa (Western Hardy), Ash-leaved Maple, White Ash, White Elm, White Maple, preferred in the order named. For lowlands, also in the order named: Cottonwood, Black Walnut, Catalpa (Western Hardy), Honey Locust, White Maple, Red Elm, White Elm."—(G. B. McNeil.)

Special treatment for upland: New land should have deep, thorough tillage for at least two years before planted; or, break the sod in June, sow wheat in fall, and the next year, soon after harvested, plow it deep and thoroughly, and repeat it in October. It is then ready for a fall planting of Black Walnut, as soon as the nuts are ripe. Mark off the land in rows each way, six inches deep, and cross-mark. Drop a seed at each crossing, and press it into the land with the foot. Seeds of the Ash-leaved Maple, Elm, and Ash, two in a place, require light covering, not over one-half an inch. White Maple, which ripens in the spring, should be planted at once; will make quite a growth same season. Of Cottonwood, use cuttings fifteen inches long. Set them twelve inches into the ground, in a perpendicular position, with a spade, and not on an incline, as has been recommended. In this way they make a straighter tree, and do not hinder close culture; they will endure drouth better, and make a more vigorous growth. For the second year's cultivation use a Weir nine-inch steel-beam sandy-land plow. For one-horse effective work, use the double-shovel accompaniment. We need a longer and narrower spade for setting cuttings than any now offered in the market.

The conditions of climate and soil are more favorable to plant-growth than formerly.

Every furrow turned and kept under tillage, every tree planted and successfully grown, tends to keep the atmosphere cooler and impart moisture. But whether such favorable changes as have occurred within the past few years will continue, and increase year after year, time alone can determine. At the present time our people are greatly encouraged, and hopeful for the future.

We have faith in the work which has been begun for reclaiming these Western prairies from a barren waste, and in common with the many settling thereon, will lend our helping hand.

WABAUNSEE COUNTY.—By H. A. Stiles, Pavilion.

(North half.)

The condition of forest-tree plantations was good at the opening of the past spring. Made a fair wood-growth the previous season. Owing to the abundance of native forests, artificial planting was not extensive the present year, but it was in all cases a success, failures not exceeding five per cent. The Black Walnut, Catalpa, Russian Mulberry, Honey Locust and Cottonwood (this fails on upland) were most extensively used, and are preferred in the order named.

The varieties named in the Society's recommended list are successfully grown. I would add to this list for uplands, the Chinquapin Oak, Native Mulberry, Russian Mulberry, Hickory, and Red Cedar. For lowlands, the entire list is well adapted. For wet lands, the Common and White Willow.

Planting and cultivation: Seeds of the Black Walnut should be used, as the trees do not successfully transplant. All other varieties are easily transplanted, and it is economy to grow them in nursery form, and plant in forest rows when one year old, excepting the Cottonwood, which is easily grown from cuttings. Plant all classes in rows four feet apart each way, and give thorough and frequent cultivation; and for uplands a good mulching is highly beneficial. A northern slope is preferable for upland plantations.

Insects: A web-worm appears on the Black Walnut; a measuring-worm some years defoliates the White Elm. Spraying with a compound of carbolic acid and water destroys this pest. Borers attack the Cottonwood when planted on thin soils. The other species are exempt so far.

Planting timber should be strongly encouraged. It improves our climate and soil; it increases the rains, and more evenly distributes them during the growing season, rendering the atmosphere more humid, and strengthening the volume of springs.

Russian Mulberry: I have it planted on bottom land, where it is hardy, but of a dwarf character. Do not believe it will do well on uplands. The fruit has no special value.

It is apparent to everyone who has lived in the State for ten or fifteen years, that trees, shrubs, plants—yes, I will include all classes of vegetation—thrive much better than formerly; that hot winds are less frequent, and the climate generally more favorable. This, in my opinion, is the result of an increased tree-planting, and the extensive areas devoted to farm crops. Every farmer, gardener, and orchardist helps to augment such favorable conditions. As orchard trees afford a mutual protection, so every forest tree planted aids the success of others. I have no doubt but that all our Western prairies may be made to produce all the necessary wood for fuel, fencing, and other purposes where needed on a farm; and as the tree-planter approaches, the desert line will rapidly recede, drouths will disappear, and fruitful fields and willing springs abound where now dearth and barrenness prevail. This is the work of the sturdy pioneer, through whose indomitable will and powerful arm the treeless plains will yet be reclaimed, and furnish happy homes to millions of our people.

(*South half.—By P. S. Taylor, Eskridge.*)

The condition of forest-tree plantations was good at the opening of spring in 1885, excepting the White Maple, which was injured by borers. The planting this season was more extensive than in previous years, and a greater interest manifested in the work. It was highly successful, where properly treated. The Catalpa (Western Hardy), Cottonwood, Ash-leaved Maple, White Maple, Ailantus, Osage Orange, and Honey Locust, in the order named, were most generally used.

Of the recommended list by the Society, some varieties are more successful than others; but all are safe to use, and will repay the cost of planting and after-care. As a substitute for the White Maple, use Hackberry, Red Cedar, or any of the best Willows; or for high, dry lands, use the Ailantus.

In this county, it is decidedly profitable to plant forest trees on the uplands. My own are on land not suitable for general farm crops, and all varieties planted promise to be successful. For such locations, use Catalpa (Western Hardy), Osage Orange, Honey Locust, Black Walnut, Red Elm, Ash-leaved Maple, Cottonwood, Ailantus, Red Cedar, and Hackberry, preferred as named. For lowland, Black Walnut, Catalpa (Western

Hardy), White Ash, White Elm, Honey Locust, Osage Orange, Red Elm, Ash-leaved Maple, Hackberry, and Cottonwood.

With the ground deeply plowed and well pulverized, plant in rows three and a half or four feet each way, cultivate well, and success will follow. Close planting affords shade and shelter to each tree, and causes a better upright growth. It is advisable to cut back all plants to the ground early in the spring of the second year, which will cause a strong and straight shoot to grow, for the body of the future tree.

I am fully satisfied that forest trees will be grown on all of our Western prairies in sufficient quantity to furnish all the wood needed on the farms.

SOUTHERN DISTRICT.

ALLEN COUNTY.—By H. E. Van Deman, Geneva.

Forest trees have not been planted extensively in this county; but such as have been made a successful growth, and with few failures. The White Maple and Catalpa (Western Hardy) have been most extensively used.

The recommended list of the Society is successfully grown; have generally been planted in rows four feet apart each way, and cultivated in same manner as that given corn through two years, and then left to take care of themselves.

The faults of varieties in the list are: Black Walnut makes too slow a growth, except when planted on rich land; Cottonwood is almost worthless when grown for any purpose except shade, and shelter-belts; White Maple and Ash-leaved Maple are not much better. Each of the last three named are quite subject to attacks of borers. We have no substitutes, I am sorry to say, for these.

For uplands, I would use in the order named, as most valuable and successful: Catalpa (Western Hardy), White Ash, Honey Locust, Red Elm, Black Walnut, White Elm, Osage Orange, White Maple, Cottonwood, and Ash-leaved Maple.

For lowlands, Catalpa (Western Hardy), Black Walnut, White Ash, Honey Locust, Red Elm, White Elm, Osage Orange, White Maple, Cottonwood, and Ash-leaved Maple.

The Russian Mulberry has been tried in this county. It thrives best on bottom land. It does not promise to make a tree of good proportions; is only a large, branching, shrubby tree.

The conditions of climate and soil are not more congenial to forest-tree growth than formerly in this section.

From observation and experience, I am fully convinced that the Western prairies can be made to produce forest trees in sufficient quantity to meet the wants of settlers thereon.

(*South half.—By B. F. Pancoast, Iola.*)

The planting of forest trees in this section was not more extensive the past spring than in previous years, but more successful, the failures being very light. White Elm, Catalpa, Honey Locust and Mulberry were most extensively used. White Elm and Catalpa were most successful.

I would recommend the following varieties to planters, and in the order named, as valuable for timber: Black Walnut, Catalpa, White Ash, and Honey Locust. The other varieties in the list are planted mostly for shade trees and receive very little culture, being largely mulched only.

Insects: I know of none attacking these trees excepting the maple worm, and they on the White Maple.

Substitutes: I would use Pecan, Shellbark Hickory, Mulberry and Burr Oak on bottom lands in place of White Elm, Cottonwood, White Maple, and Red Elm.

For upland prairie I would recommend Black Walnut, Catalpa (Western Hardy), Osage Orange, and Mulberry, for fuel, fence posts, and lumber; also, as a means of breaking the force of winds thereby preventing drouths. For lowlands, would add to the above White Ash, Pecan, Kentucky Coffee Tree, Shellbark Hickory, and Burr Oak. Cultivate thoroughly and thin out whenever necessary.

Russian Mulberry has heen planted; is hardy, grows vigorously on most soils, and is free from insects; but is not preferable to our native variety.

I believe the conditions of climate and soil of our upland are more congenial to forest-tree growth than formerly, owing to a more continued moisture during the warm weather. This has been brought about by the cultivation of broad fields, and the growth of hedges and forest trees.

(*South half.—By C. C. Kelsey, Humboldt.*)

The condition of forest-tree plantations was good in the spring of 1885. The extent of planting the present season was not greater than in previous years, but was successful. Black Walnut, Catalpa, White Elm and Native Ash were most largely used.

All the varieties named in the Society's recommended list are successful on the lowlands, but on the uplands the Cottonwood and White Maple are not satisfactory.

Russian Mulberry has been planted on a small scale. It requires a good deal of pruning to make a nice-shaped tree, otherwise it is an unsightly bush, but a rapid grower.

From observations and experience, I believe the Western prairies can be made to produce an abundant forest-growth to supply the wants of the settlers in fuel and fencing, and other purposes needed on a farm.

BARBER COUNTY.—BY W. E. CAMPBELL, NEW KIOWA.

(*South half.*)

Forest-tree plantations were in a very good condition at the opening of the spring of 1885.

There is a very much greater interest among the people of this county in forestry, and the extent of planting the present season was much greater than in previous years, which was practically an entire success. The varieties most extensively used were the Catalpa (Western Hardy), Black Walnut, Russian Mulberry, Black Cherry, White Maple, Ash-leaved Maple, Green Ash (native), and Cottonwood; Evergreens—White Pine, Scotch Pine, Black Austrian Pine, Red Cedar, and American Arbor Vitæ. Honey Locust was planted to some extent successfully.

All the varieties named in the Society's recommended list are successful in this county, excepting the White Ash, which is an entire failure and unworthy of cultivation in southwestern Kansas. The Green Ash, a native species, succeeds on damp lands. White Elm and Red Elm grow very slowly, but make beautiful shade trees. Osage Orange and Honey Locust are objectionable on account of their thorns. Cottonwood and Ash-leaved Maple are damaged by borers and their wood is not valuable or lasting.

Substitutes: Green Ash in place of White Ash; Thornless Honey Locust in place of the Common Thorny; Black Cherry in place of the soft-wood varieties; and the Russian Mulberry for Osage Orange, Cottonwood, and Ash-leaved Maple. A more suitable list, arranged in the order of economic value, would be: Catalpa (Western Hardy), Russian Mulberry, Black Walnut, Black Cherry, Thornless Honey Locust, and Green Ash. This list, omitting the last named, can be profitably grown on uplands, and with the Cottonwood, for a quick supply of fuel on account of its rapid growth, forms a suitable list for lowlands.

Plant in rows four feet apart each way, and give thorough cultivation with a two-horse cultivator the first year, and thereafter with a single-horse cultivator.

Russian Mulberry is a vigorous grower and hardy tree. No tree is better adapted for screens or wind-breaks, and its fruit attracts birds from the fruit of the orchard.

The conditions of climate and soil are more congenial to plant-growth than formerly. Rainfalls have greatly increased during the past decade of years.

There is no doubt but that the Western prairies can be made to produce forest trees sufficient to meet the wants of settlers thereon.

HISTORY OF MY OWN EFFORTS.

The past season I made a plantation of 230,000 Catalpa, Black Cherry, Black Walnut and Russian Mulberry trees. Of these, 172,000 were Catalpa; the Russian Mulberry were only used around the borders, or in the outside rows. The ground was prepared as for corn, and laid off with a marker into rows four feet apart each way. In one portion of the plantation I interspersed the Black Walnuts by setting every fourth tree in every fourth row with them, thus making them stand sixteen feet apart each way, with three rows of Catalpas between them (each way). The Black Cherry trees I interspersed in like manner, in another portion of the plantation, twelve feet apart each way. All were cultivated with two-horse cultivators.

The trees were principally bought from R. Douglas & Sons, Waukegan, Ill., and shipped by the car-load. They arrived in excellent condition, and made a wonderful growth.

All forests should be planted 4x4 feet, not only to admit of easy and thorough cultivation, but to insure a vigorous upright growth, thereby avoiding unnecessary pruning, and affording protection to each other. This method of planting is becoming more popular each year.

Elm, Hackberry, Box Elder, White Maple, Black Locust and Green Ash all grow reasonably well, but are not as desirable as the varieties first named. Walnut seed, after being frosted over winter, can be planted in rows, 4x4 feet, and will come up almost as readily as corn, and can be cultivated the first year. In six years from planting they will bear fruit. Of the evergreens I have tried, the Red Cedar, Scotch and Black Austrian Pine have succeeded best. Out of some 3,000, planted on sod, (12x16 feet,) among corn, not more than 4 per cent. died. The rest made a splendid growth.

BOURBON COUNTY.—By M. J. Becker, Fort Scott.

(*East half.*)

This county has a large area of natural forests, therefore the only planting has been for shelter-belts and along the highways; all such, where properly cared for, were in good condition in the spring of 1885. The planting of the present year was generally successful.

The varieties recommended in the Society's list have been successful in this county; but the White Maple, Black Walnut, Cottonwood, Catalpa and Ash-leaved Maple were most extensively used, and preferred in the order named. I cannot recommend the Honey Locust, as I consider it a nuisance. Black Walnut, Cottonwood, White Maple, Shellbark Hickory and Chestnut are preferable to some found in the Society's list.

Insects: A tent caterpillar is troublesome to the Black Walnut, and should be promptly destroyed on appearance. The foliage of Elms and the White Maple are devoured by worms.

Russian Mulberry has been planted to some extent. The trees are yet small, make a slow growth, but appear to be hardy.

(*West half.—By W. W. Reynolds, Lakeside.*)

Artificially-planted forests were in good condition at the opening of the spring of 1885. The planting of the present year was in extent equal to that of last year, and in most cases successful. Failures were quite light. The Black Walnut, White Maple, Lombardy Poplar and Osage Orange were most extensively used.

The varieties recommended in the Society's list all succeed in this county. I would, however, add thereto the Pecan, Horse Chestnut, English Chestnut, and Lombardy Poplar; the last-named being a rapid, straight grower, is quite handy for poles; it is short-lived, but easily grown from cuttings. The White Maple has the objection of being attacked by the maple worm. Planting on upland is profitable, and I would use the Peach. It makes the best of fuel when seasoned. Plant the pits in rows in the fall, six feet apart and two feet in the row, covering them two inches deep; cultivate thoroughly, and liberally manure the ground. Five acres of such would furnish a continual supply of fuel for a single farm. By cutting from one side of the plantation they will renew their growth sufficiently in five years to permit cutting over the ground again. Besides the wood furnished, a large amount of fruit also would be grown.

Russian Mulberry: A few have been planted, and from all appearances they will succeed.

The condition of climate and soil have become more congenial to forest-tree growth than formerly. Rains are more abundant and drouths less frequent, and the land receives better tillage.

I think it only a matter of time when the settlers on the Western prairies will grow trees in sufficient quantity to supply them all the timber and fuel needed.

BUTLER COUNTY.—By Wm. H. Litson, Benton.

Artificially-planted forest trees were in a healthy and sound condition on March 1, 1885, and such as were planted during the season were successful. Cottonwood, Black Walnut, Ash-leaved Maple, Elm, White Maple and Osage Orange have been most generally used and successfully grown.

All the varieties named in the Society's recommended list succeed in this county. Their faults are as follows: Catalpa makes a rather scrubby growth; Cottonwood and Ash-leaved Maple are worthless for timber, and with the White Maple, are subject to sun-scald and attacks of borers. If the Catalpa is cut to the ground, when one or two years old, and a single shoot allowed to grow, it will make a nice tree. I would plant Cottonwood, Ash-leaved Maple and White Maple only for shade and ornament. Black Walnut and Osage Orange are preferred for both upland and lowland plantations. Seed of the first should be planted in the fall, where the tree is to form. Of all the others, excepting the Cottonwood, which can be easily propagated from cuttings set in either fall or spring, plant the seed in spring, in nursery form, and transplant when one or two years old.

I am not aware of any change in conditions of soil or climate, other than an improved condition of the land from tillage.

Yes; I believe that the Western prairies can be made to grow sufficient forest trees to meet the wants of the settlers thereon.

CHAUTAUQUA COUNTY.—By M. B. Chrisman, Wauneta.

(*North half.*)

The condition of artificially-planted forest trees was good at the opening of the spring of 1885. Planting has not been extensive, but successful—not more than ten per cent. failing. Black Walnut, White (soft) Maple, Ash-leaved Maple (Box Elder), Catalpa, Cottonwood and Elm were most largely used.

I consider the present recommended forest-tree list of the Society safe to follow by planters in this county. I would not change it, or substitute others for any variety it contains. The list is adapted to our uplands, which are rich, and retentive of sufficient moisture for plant-growth. The Black Walnut, Cottonwood, White Maple, Catalpa and Osage Orange do well on such soils.

Land for a plantation should have good tillage for at least two years before being used for such purpose. After being planted, it should be frequently cultivated each year, and as long as possible without injury to the trees, and at the close leave the land as level as practicable.

Insects: A very few borers and some caterpillars attack the trees.

Russian Mulberry has been quite recently introduced; has not been sufficiently tested to warrant any report of its merits or objections.

The conditions of climate and soil are, in my opinion, more congenial to forest-tree growth than formerly. Rains are more frequent, more of the land is under cultivation, the area of timber has been extended, winds are obstructed, and hence less parching to the earth. These are facts, and not theories.

I am fully confident that whenever the above conditions are attained on our Western prairies, they will be made to produce sufficient forest trees to meet the wants of the settlers thereon.

(*South half.—By Dr. D. C. Baldwin, Hart's Mills.*)

Forest-tree plantations were in a very good condition at the opening of the past spring. Such plantings have not been extensive in any year, from the fact that this county is quite well supplied with natural forests. But where such work was done, the results were a success. The Black Walnut, White Maple and Cottonwood were most extensively used.

The kinds named in the recommended list of the Society are successfully grown in this county, and I can seen no reason to change or substitute, but would add the White Walnut, which succeeds equally as well as those named.

On uplands, I would plant peach trees for fuel, Cottonwood for shade (it grows more thriftily on lowlands), and the Catalpa for fence posts. On lowlands, Black Walnut, Ash, and Elms.

Insects: None, except a web-worm on the Black Walnut, are present, and these in a limited number.

I have not observed any changes in our climate to be more congenial to the growth of forest trees. In this portion of the State almost everything, excepting the tropical fruits, can be grown.

CHEROKEE COUNTY.—By D. S. Freeman, Columbus.

The condition of forest-tree plantations in this county on March 1, 1885, was excellent, and such as were planted the present season were successful, and more extensive than in previous years. Catalpa (Western Hardy), Elms and Ash-leaved Maple were principally used.

The varieties named in the Society's recommended list have been successfully grown so far as tried. I would substitute Linden (Basswood,) for Honey Locust, Hard Maple for the White, and American Chestnut for Osage Orange. The Soft or White Maple is a beautiful, rapid growing tree, but of late years has been defoliated by worms.

I do advise planting trees on uplands as profitable, and recommend the Catalpa (Western Hardy), Black Walnut, Ash, American Chestnut and Linden for such locations. For lowlands, Black Walnut and Cottonwood. All kinds should have similar cultivation to that required for the success of apple trees. On uplands, about the middle of May, a good mulching should be applied.

Russian Mulberry, so far as tried, is a rapid-growing tree, but requires constant attention to induce an upright growth. Succeeds on almost any soil. All kinds of trees succeed better than they did ten or fifteen years ago. The climate has become more humid and rains more frequent. These changes are attributed to general cultivation of the land and prevention of prairie fires.

We are selling thousands of trees in western Kansas each year, and receiving statements from our patrons of the most flattering results, and in eight cases out of every ten they are promising a grand success. If every farmer would plant from three to ten acres with deciduous forest trees, and give them even moderate care, western Kansas would soon produce all the fuel needed.

Our Legislature could do no better or wiser act than to pass a law which will exempt the land devoted to such purposes from taxation.

CLARK COUNTY.—By C. H. Stone, Ashland.

There were no forest plantations in this county until the present year, as it was overrun by range cattle, cowboys and coyotes until June 1, 1885. The planting since has been successful. I have the Catalpa, Osage Orange and Yellow Locust grown from seed planted the past spring on subsoiled sod land, and some of the Locust now measure four feet in height. The Russian Mulberry, White Maple, Cottonwood, Osage Orange, Yellow Locust and Catalpa have been the most extensively used. All except the Cottonwood were most successful, and have been given thorough cultivation.

There have been no insects to trouble our trees.

I would advise planting on upland. My own plantation is on such a location. The Yellow Locust takes the lead.

From observations and a limited experience, as well as a knowledge of forest trees, I am of the opinion that forest trees will be successfully grown on all our Western prairies in sufficient numbers to meet the wants of the settlers thereon.

COFFEY COUNTY.—By Chas. A. Dow, Hartford.

The condition of forest-tree plantations was good in the spring of 1885, and such as were planted during the spring were successful. These were principally constructed with White Maple, Catalpa, Ash-leaved Maple, Black Walnut, Russian Mulberry, and White Elm.

All of the varieties named in the Society's recommended list are successfully grown in this county.

I would advise planting on uplands, and for such locations the White Maple, Catalpa, Osage Orange, Ash-leaved Maple and Russian Mulberry are preferred. Cottonwood is not a success on uplands, as it is not long-lived in such locations. For lowlands, I recommend the White Maple, Cottonwood, Catalpa, Ash-leaved Maple, White Elm, and White Ash.

Russian Mulberry has proven hardy, and when planted close and properly trimmed promises to make a tree of good size. It is desirable not only as a tree, but for its fruit, which affords food for birds, which they are very fond of, and will not touch other fruits while there are plenty of mulberries. The best growth I have seen of the tree was in an upland plantation.

Most of the forest-trees planted in this county have been in the construction of shelters, wind-breaks, and for ornamentation.

COWLEY COUNTY.—By Jacob Nixon, Kellogg.

The condition of artificial forests was good at the opening of spring in 1885. The planting the past season was extensive as compared with previous years, and fairly successful; failures did not exceed ten per cent. The Catalpa (Western Hardy), Black

Walnut, Osage Orange, White Maple, Ash-leaved Maple and Cottonwood were extensively used on bottom lands.

The recommended list of the Society is successful in this county. The only objections to the varieties are as follows: Black Walnut, slow growth unless planted among other kinds; Catalpa, easily broken by winds; Osage Orange, being a thorn-bearer; Cottonwood fails on upland. Mulching *on upland* is an advantage to all classes.

Insects: Caterpillars attack the Black Walnut, and borers the Ash and Cottonwood. The caterpillars are easily killed by discharging a blank cartridge from a shot-gun into their nests early in the morning or late in the evening. Flat-headed borers are held in check by thorough cultivation and mulching, which produces a vigorous tree-growth.

The following is a list recommended for planting in this county, and arranged in the order of preference: 1. Black Walnut, 2. Osage Orange, 3. Catalpa (Western Hardy,) 4. White Ash, 5. Ash-leaved Maple, 6. Red Elm, 7. Cottonwood, 8. White Maple, 9. White Elm, 10. Honey Locust. For uplands: Nos. 2, 3, 5, 8, 10, to which add Russian Mulberry. For lowlands: Nos. 1, 2, 3, 7 and 10 of the list. The Russian Mulberry is a success wherever tried.

Treatment of upland plantations: The land should be prepared as for a crop of corn before planting. Set in rows four feet apart each way; cultivate thoroughly each year until July 1st, then mulch heavily with old prairie hay or straw until the following spring, when it should be piled up in the tree rows, and the space between cultivated as in the year before, and mulching replaced.

I do not discover any material change in the condition of climate or soil. The main causes of failure are in a neglect to properly cultivate and mulch at the proper time.

I am satisfied that with proper management the Western prairies can be made to produce forest trees in sufficient quantity to meet the wants of settlers thereon.

CRAWFORD COUNTY.—By L. J. Colton, Girard.

Forest-tree plantations in this county were in good condition at the opening of spring in 1885. The Catalpa, Black Walnut and White Elm have been most commonly used.

All the varieties named in the Society's recommended list have been successfully grown in this county. I would rearrange the list in the following manner, as the comparative merits of each would be better understood for planting here: 1. Black Walnut, 2. Catalpa, 3. White Ash, 4. White Elm, 5. Ash-leaved Maple, 6. Honey Locust, 7. White Maple, 8. Osage Orange, 9. Red Elm, 10. Cottonwood. For uplands, I would use only Catalpa, Black Walnut, and White Maple. I would not advise using lowlands for such purposes in this county, as the expense for their preparation is too great for the present. Objections: Osage Orange, thorny; Cottonwood, poor timber when grown; White Maple, breaks off easily by wind, and when loaded with ice in winter. I know of no substitutes which would make the list more valuable.

Land for forest trees should be well tilled the year before it is to be planted. Set the trees in rows four feet apart each way. Close planting will cause a straight growth, and can be thinned in after years when necessary. The trees thus taken out have a value for poles or stakes. Cultivate the rows each way until too large to admit a team without liability of injury, and then mulch with hay, straw or any material most plenty, and keep down all weeds. A dressing of manure will pay when it can be obtained with light expense.

Insects: None are troublesome excepting the maple worm and caterpillars on the Black Walnut. These are generally killed while young.

I do believe that our Western prairies will produce forest trees in sufficient quantity to supply the settlers with wood for fuel and such other purposes as needed for on the farm.

DECATUR COUNTY.—By G. Cyrus, Hawkeye.

Forest-tree plantations were in good condition at the opening of the spring in 1885. Planting during the present year was more extensive than that of previous years, probably owing to an increase in settlements, and was successful; not to exceed ten per cent. failed. Ash, Ash-leaved Maple, Honey Locust and Black Walnut were mostly used, and some Catalpa, Osage Orange, and Cottonwood.

All the varieties named in the Society's recommended list, excepting Maples, succeed in the county. I think the Russian Mulberry is preferable to the White Maple.

The following list is preferred, in the order named: White Ash, Ash-leaved Maple, Honey Locust, Black Walnut, Cottonwood, Catalpa (Western Hardy), Osage Orange, Russian Mulberry, and Elms. All of these except the Cottonwood succeed on upland.

The Russian Mulberry has been planted, and is hardy and vigorous, promising to make a desirable tree. So far, it seems to thrive on any kind of soil.

Land for tree plantations should be plowed into narrow strips and deeply stirred several times, and so as to bring the dead-furrow in the same place each time before planting. Cross-harrow thoroughly, and set the trees in the furrows. This provides the best conditions for them to grow in, and serves to gather and retain the rains immediately around the trees. In cultivating, gradually work the ground towards the rows.

Insects: The Ash was largely defoliated by a large worm. These were destroyed by knocking them from the trees and crushing them. Later in the season appeared a large bug, which ate the tender leaves and ends of sprouts. These I found I could not successfully combat, so I let them work.

The conditions of climate and soil are decidedly more favorable to tree-growth than formerly, as there is now a much greater amount of moisture in the atmosphere and the ground. The most important factors in causing this change are the bringing the surface of the land under cultivation, prevention of prairie fires, and a heavier growth of grass which covers the land, holding moisture from rainfalls and snows, preventing sudden evaporation, cooling the atmosphere, and which brings more frequent and heavier dews.

From my experience and observations I am convinced that the Western prairies can be made to grow sufficient forest trees to meet the wants of settlers thereon. The timber-culture act should not be repealed, but be given a more rigid enforcement. If forest-tree planting received one-half the attention it should, there would be complete success in such efforts.

ELK COUNTY.—By S. D. Lewis, Elk Falls.

Forest-tree plantations were in the very best of condition at the opening of spring of 1885. A few timber lots were planted the past spring, but for shade and ornamental purposes the planting was extensive and successful—failures not exceeding five per cent. The Catalpa (Western Hardy), Black Walnut, Osage Orange, Russian Mulberry, White Maple and White Ash were most extensively used.

The recommended list of the Society is a success in this county, with the exception of the Cottonwood and White Maple, which die more or less every year, from defoliation by worms. Substitutes: I would recommend Pecan for the White Elm, Russian Mulberry for the Cottonwood, and White Oak for the Honey Locust.

The Cottonwood, Ash-leaved Maple, White Maple and White Elm should not be planted for timber purposes in this county, on account of the worthless character of their wood when grown, and their liability to injury from leaf-eating insect attacks; but these can be suppressed by spraying the leaves with a solution of Paris green. No other insects are present in numbers sufficient to attract attention.

I do advise planting on uplands, for fuel, fencing and other purposes, where wood is needed on a farm. The most profitable thing any upland farmer can do is to plant from one to ten acres on every forty acres of land he owns. If the selection of varieties is intelligently made, and the plantation properly cared for, it will pay him annually five hundred per cent. profit on the cost. For such purposes in this county, I would recommend the Catalpa (Western Hardy), Osage Orange, Red Elm, Russian Mulberry, and White Oak. For lowlands, Catalpa (Western Hardy), Black Walnut, Pecan, Shellbark Hickory, Red Elm, and White Ash.

For all timber plantations the ground should be prepared the same as for a crop of corn, and the trees given as thorough cultivation until they completely shade the land between the rows. Seed of the Black Walnut should be planted in the fall, in rows three feet apart each way. Other varieties grow in the nursery, and transplant at one year old into rows, same distance as for Black Walnut. Upland and lowland plantations require the same treatment.

Russian Mulberry: This tree has been successfully planted, and thrives on all classes of soil—on rich bottom and high gravelly or rocky hills, and it will grow on prairie sod, and without cultivation. It is perfectly hardy and a vigorous grower, branches very thickly from the ground up, and for wind-breaks there is no tree its equal.

I doubt if there has been any material change in our climate. I believe the greater success of the recent efforts is due to the better condition of the land, and a more intelligent application of means. Hundreds of farmers would plant timber-lots where one does now, if they understood the proper way and management, and at what little cost they could raise all the timber and fuel they would need in a few years.

From observations and experience, I believe that there is not a county in the State which cannot be made to produce timber sufficient to meet the wants of its settlers for fuel and fencing in a few years, and, in time, much of their building material. Wherever grass or any other crops will grow, timber can be grown.

FINNEY COUNTY.—By C. H. Longstreth, Lakin.

Forest trees have not been extensively planted in this county, owing to it being so recently settled; but the young trees, when properly cared for, were in good condition at the opening of spring in 1885. The present year's planting has been more extensive than in any previous one, and has been successful. The following species have been most extensively used, and are preferred in the order named: Honey Locust, Black Walnut, Osage Orange, Green Ash, Russian Mulberry, Catalpa (Western Hardy), Ash-leaved Maple, and Cottonwood.

The Society's recommended list is a success in this county, excepting the White Maple. The Cottonwood succeeds only on lowlands, where it makes a vigorous and healthy growth. I would add Red Cedar to the list, as it promises to be successful and valuable for this part of Kansas. The Hackberry also should have a place in the list. For wind-breaks, plant Red Cedar, Black Austrian, and Scotch Pine.

I advise planting forest trees on uplands for wind-breaks and shelters, fuel and fencing purposes. For such locations, use Honey Locust, Black Walnut, Osage Orange, Russian Mulberry, Red Cedar, and Hackberry, and where they can be irrigated, add Catalpa White Ash, Ash-leaved Maple, Elms and Cottonwoods. All of these, with the Willows succeed on our lowlands.

Treatment of uplands: It is essentially necessary to plow the land deep, pulverize thoroughly, and to give the plantation thorough cultivation each year until the trees get well started and will shade the land between the rows. Unless they can be given this treatment it is useless to plant. Plant in rows four feet apart and from two to four feet in the row. Spring-time is preferred for either seeds or young trees.

Russian Mulberry: Trees of this sort have been planted quite extensively in this county the past season. It is very hardy and vigorous. I very much doubt its ever making a large-sized tree. It will soon make a suitable size for fence posts and good fuel. It thrives on any of our lands, but makes the greatest growth on that which is most sandy. The conditions of climate and soil are apparently more congenial to plant-growth than formerly.

There is an increased humidity in our atmosphere; rains are more frequent, generally distributed and gentle. These changes have been brought about, in my opinion, by the breaking up of the prairie sod and its tillage, and the more general improvement of the county by the building of houses and railroads and the construction of telegraph lines.

I am fully confident that these Western prairies can be made to produce forest trees sufficient to meet the wants of the settlers thereon for fuel, posts, and eventually for lumber purposes. From the present efforts made in forest-tree planting and the destruction of natural forests going on in the eastern portion of the United States, it is evident that the future forests will be found most extensive upon what are now termed the "treeless plains." We have the soil, and the climate is rapidly shaping for such developments.

FORD COUNTY.—By Jas. Nicoll, Spearville.

(*Northeast portion.*)

Forest-tree plantations were in a fair condition at the opening of the spring of 1885, and those planted this season were successful, and in extent exceed that of any previous year. Failures did not exceed ten per cent. The Cottonwood, Russian Mulberry, Ash-leaved Maple, Honey Locust, Kentucky Coffee Tree and Black Walnut were most extensively used, and all made a good growth, where properly planted and cultivated.

I advise planting on uplands, and for such locations recommend the following, and to be preferred in the order named: 1. Catalpa, 2. Black Walnut, 3. Osage Orange, 4. Kentucky Coffee Tree, 5. Mulberry, 6. White Ash, 7. Hackberry, 8. White Elm, 9. Honey Locust, 10. Black Locust. For lowlands, Gray Willow, Cottonwood, Green Ash, White Elm, Ash-leaved Maple, and White Maple.

Insects: None among our forest trees, excepting a worm which feeds on the Cottonwood.

The Russian Mulberry has been planted extensively the past two years, and makes a good growth.

I firmly believe that in time these Western prairies will be made to grow forest trees in sufficient quantity to supply the settlers with fuel, and wood needed for many other purposes.

(*Central portion.—By G. C. Kolff, Dodge City.*)

Notwithstanding the severe winter of 1884–5, most all artificially-planted forest trees came through in good condition. In consequence of the great influx of new settlers, and scarcity of vacant lands, most every timber claimant gave exceptional care to his timber claim, for fear of a contestant, as several claims had been sadly neglected before. The favorable weather and continuous moisture this season were very advantageous to the sprouting of seeds and the growth of young trees. So generally this year has been a very successful one. Very few failures occurred in plantations which were thoroughly cultivated and kept clear of weeds.

The Honey Locust, Black Walnut, Osage Orange and Ash-leaved Maple are considered the most successful species in this county, therefore are most extensively planted. But the Catalpa and Cottonwood are also successfully grown.

All of the varieties named in the recommended list of the Society succeed in this county. The Honey Locust, Osage Orange and Ash-leaved Maple are successfully grown on our uplands, and will afford a sufficiency of wood for fuel, while the Osage Orange will be planted for hedge fencing. For lowlands, the Cottonwood and Black Walnut are preferable. All species do best on such locations.

Land selected for forest plantations should have deep and thorough preparation. Yearling trees are considered more successful than seeds, and spring the safest time to plant. Set in rows four feet apart, and cultivate continuously. Upland plantations require deeper plowing and preparation of the land, and more cultivation after planting than lowlands, and if mulching with some material which will retain moisture is placed along the rows, it will break the force of the sun's heat, and prove quite an advantage to young trees.

Insects and pests: Rabbits injure the Black Walnut in winter; borers attack the Ash-leaved Maple, and a large worm defoliates the Cottonwood. Remedy: Tobacco water sprayed upon the trees seems to protect the foliage and destroy these worms.

Russian Mulberry: This tree thrives on most any soil and location protected on the north; is hardy and vigorous, and promises to make a good-sized tree. It is well adapted to hedge purposes.

The increased rainfall of the last year is more congenial to all tree-growth, and the more extensive and better tilling of the land and increased settlement of the country undoubtedly have had some influence to modify the sterility of the country.

It is an established fact that forest trees can be grown in any quantity on most all of these Western prairies. But it requires considerable care and energy, and as soon as people are compelled to give full attention to fulfilling the requirements of the law regarding their timber claims, and no excuse or indulgence is allowed by the General Land Department, these naked prairies will soon wave with flourishing forests.

(*Northwest portion.—By D. F. Trask, Cimarron.*)

The forest trees in this section were killed to the ground by prairie fires, the past year; but started from the roots, and made a growth of from one to four feet. Planting, the the past spring, was not extensive; such as was done was reasonably successful. The Black Walnut, Catalpa and Honey Locust were mostly used. Seeds of the first should be planted in autumn where they are to form the future tree; Catalpa in spring. So far, the germination of Honey Locust seed has been slow, sometimes remaining in the ground three or four years before sprouting.

Insects have not been troublesome.

For uplands, I would advise planting Black Walnut, Catalpa, Osage Orange, Honey Locust and White Ash. Give them a thorough cultivation as for corn, and they will be successful.

Russian Mulberry has proven hardy, and will make excellent wind-breaks, as they grow bushy.

The conditions of climate and soil are more favorable for tree-growth, as well as other characters of vegetation, owing to a more uniform distribution of the rainfall; and from observations, I am satisfied that in time these Western prairies will be made to produce forest trees in sufficient abundance to meet the wants of settlers thereon.

(*South half.—By F. Caldwell, Crooked Creek.*)

The condition of forest trees planted in this part of the county was good at the opening of spring of 1885, and the planting of this year was extensive.

The varieties named in the Society's recommended list are all successfully grown, excepting the Osage Orange, of which I cannot speak. They require deeply-prepared ground, well worked before planted, and frequent cultivation each year.

Insects: Have not discovered any troubling the trees.

The conditions of climate and soil are more favorable to forest-tree growth than formerly, owing to an increased rainfall and less winds. These causes are attributed to breaking up of the sod, growing crops and trees, and prevention of prairie fires.

From observation and experience, I believe that the Western prairies can be made to produce forest trees in abundance to meet the wants of settlers thereon.

HARPER COUNTY.—By S. H. Nesbit, Anthony.

Forest-tree plantations were generally in good condition when spring opened. The plantings of the present year were successful and more extensive than that of previous years. No failures occurred. The Black Walnut, Black Locust, Catalpa, White Ash, Cottonwood, Honey Locust, White Maple, Red Elm and Osage Orange were most extensively planted and equally successfully grown.

The varieties named in the recommended list of the Society all succeed in this county, and I would not make any changes excepting to substitute the Black Locust for the White Ash, as there is more money in this tree either for groves or shelter-belts. We need a great many posts, and none make better and few so good as the Black Locust.

Forest trees need thorough cultivation for at least three years after planting, and as much longer would be a great advantage to their growth.

Insects: None trouble our trees excepting the tent caterpillar on the Black Walnut. They are easily disposed of by spraying the tree with a solution of Paris green, one teaspoonful to a pail of water. Two or three applications will clear them out.

Russian Mulberry succeeds wherever planted. It is hardy and vigorous. I have this tree now only three years old from the cutting, which measures five inches in diameter at the collar. It needs a great deal of trimming.

Trees of all classes make a more vigorous growth than in former years. An increased rainfall and cessation of hot winds has rendered the climate and soil more congenial.

From observation and experience, I believe that the Western prairies can be made to produce forest trees in abundance to meet the wants of the settlers thereon. The main difficulty lies in the indisposition of the people to plant trees.

KINGMAN COUNTY.—By L. W. Leach, Kingman.

The condition of artificially-planted forest trees was good in the spring of 1885. The planting was more extensive during the present year than that of previous years, and was quite successful, not to exceed ten per cent. failing. Catalpa, White Maple, Ash-leaved Maple, Black Walnut and Cottonwood were most extensively used.

All of the varieties named in the Society's recommended list succeed in this county. Some of the varieties have not been extensively planted. The Catalpa and White Maple are rapid growers, hence are liable to be broken in their branches by heavy winds. They should be planted in sheltered places or in the inside rows, to be sheltered from the winds.

The uplands in this section of the State are of a black, sandy loam, and very fertile. Trees make about as strong a growth when planted on it as on our bottom lands, and I believe forest-tree plantations on the uplands can be made very profitable.

All the varieties named in the Society's list succeed on the bottoms; but I would specially recommend the Black Walnut, White Maple, Cottonwood, and Red Elm.

Insects have not, so far as I know, been troublesome to forest trees.

Russian Mulberry: I have trees now five years old from planting that measure from five to seven inches in diameter, with large, spreading tops. They are very rapid growers, seem perfectly hardy, but are inclined to grow low and very brushy, too much so to be a desirable tree for timber plantations.

The climate and condition of the soil have materially changed from what they were a few years ago. The land contains more water, as now it is found standing in low places where a few years since the land was perfectly dry. The low places on some farms, which produced the best crops six or seven years ago, are now too wet for cultivation. In my opinion such changes are the result of breaking up and cultivating the prairies, and the planting of trees.

From observation and experience, I have not the least doubt but that the Western prairies will yet produce all the wood-growth needed to supply the wants of settlers thereon.

LABETTE COUNTY.—By J. L. Williams, Oswego.

Forest-tree plantations were in good condition in the spring of 1885. The present year's planting was not extensive, but a success. The Catalpa (Western Hardy) was most generally preferred.

All the varieties named in the Society's recommended list are satisfactorily grown in this county. But I prefer to use the Black Walnut and Catalpa only in extensive forests as substitutes for the entire list. The Peach, White Maple, Cottonwood and Lombardy Poplar may be used on uplands, and are profitable for fuel, fencing and other purposes where wood is needed on a farm. Give them the same culture as a corn crop.

Russian Mulberry has been planted in this county, but is not promising as a timber tree; has been tried on all classes of soils and locations.

The climate and soil are more congenial to forest trees than formerly. Rainfall is more regular than during the early settlement of this county.

I believe the Western prairies can be made to produce forest trees in sufficient quantity to meet the wants of the settlers in these regions.

MONTGOMERY COUNTY.—By P. C. Bowen, Cherryvale.

Forest-tree plantations in most localities were in good condition at the opening of spring, and the planting of the present season has been an unusual success—Catalpa, White Maple, Cottonwood and Poplar being principally used.

For upland, the following list is recommended, and preferred in the order named: 1. Catalpa (Western Hardy), 2. Osage Orange, 3. Chestnut (American), 4. Shellbark Hickory, 5. White Ash, 6. Hard Maple, 7. White Oak, 8. Red Oak, 9. Beech, 10. Ash-leaved Maple. For lowlands—1. Red Cedar, 2. Black Walnut, 3. White Walnut, 4. Honey Locust, 5. Hackberry, 6. Red Elm, 7. Pecan, 8. Yellow Poplar, 9. Linden (Basswood), 10. White Elm.

Planting and after-treatment: Would recommend using one or two-year-old trees in planting of all classes excepting Black Walnut, the seeds of which should be planted where the tree is to be grown. Plant in rows eight to ten feet apart each way, and give thorough cultivation on the uplands. Mulching will be a great benefit.

Insects: A large green worm feeds on the foliage of the Ash, and usually appears in August; the maple-worm attacks and devours the leaves of the White Maple, and is quite prevalent in southern Kansas. I would recommend spraying such trees, when infested, with a solution of one pint of coal tar to a barrel of water.

Russian Mulberry: This tree has been planted to a limited extent, and is quite promising.

Our climate seems to be more congenial to plant-growth, by an increased rainfall, than formerly. So far as regards the successful growth of forest trees on our Western prairies, I believe it is only a matter of time when the settlers thereon will receive their supplies from forests of their own production.

NEOSHO COUNTY.—By John A. Cross, Chanute.

(*North half.*)

Forest-tree plantations were in a good condition at the opening of spring in 1885. The planting of the present season was successful, not to exceed six per cent. failing. Ash-leaved Maple, White Maple, Ash, Cottonwood, Sycamore, Poplar and Catalpa were generally used.

The recommended list of the Society is entirely successful in this portion of the county, both on the upland and lowland, and I can see no reason for changing it or offering any substitutes.

Deep tillage in preparation of the land before planting, and thorough cultivation afterwards, are the main points to be accomplished to insure the success of the plantation.

Insects: Worms defoliate the Cottonwood and White Maple, and are destroyed by spraying the trees with a solution of London purple.

The Russian Mulberry has not been sufficiently tried to warrant a conclusion.

The climate and soil have become more favorable than formerly to the growth of forest trees, by an increased rainfall.

I believe in time that the Western prairies will be made to grow successfully forest-tree plantations.

(*South half.—By C. W. Hayden, Thayer.*)

Forest-tree plantations in this part of the county were in good condition at the opening of the spring of 1885 wherever proper attention had been given them. The planting of the present year was equal in extent to that of previous years, and successful. Catalpa (Western Hardy), Black Walnut, Ash-leaved Maple, White Maple and Cottonwood were generally used.

The Society's recommended list is successfully grown, excepting the White Ash and Red Elm. Substitutes: I would recommend the Russian Mulberry in place of White Maple or Cottonwood. It has been tried on a small scale, and found to be both hardy and vigorous. Some plantings do better than others, which I cannot account for unless some were grown from seeds and the others from cuttings. It thrives on any good corn land.

I would advise planting on uplands in the order named: Catalpa, Black Walnut; on black, limestone soil, Osage Orange, Ash-leaved Maple, Russian Mulberry, White Maple, and Cottonwood. For lowlands: Plant Black Walnut first, Catalpa second, the rest of the list in the order given for upland.

Seed of the Black Walnut should be planted in permanent rows; the others grown in nursery form and transplanted when one year old. Cultivate thoroughly two or three years following, and keep them protected from stock. The Catalpa makes a finer-bodied tree by cutting it to the ground when two years old from the seed. This causes a strong sprout to grow to a good height, and which will be straight.

Insects: None are prevalent excepting the maple-worm.

Can't say as to a change of climate and soil more favorable to forest-tree growth. Trees grown under the protection, which now exists, make a better growth than when exposed to the fierce fall and spring blasts.

PRATT COUNTY.—BY J. HARREL, PRATT.

(*North half.*)

All artificially-planted forests in this locality were in a good condition at the opening of spring in 1885. The present year's planting was extensive, considering that our settlements are of a quite recent date. The Cottonwood and Black Walnut were generally used, and were a success, not to exceed ten per cent. failing. I would specially recommend the Cottonwood to planters as being a rapid grower, and succeeding on upland and lowland, if given the kind of cultivation needed to make a good corn crop.

(*South half.—By C. M. Hatfield, Bates.—July 18, 1885.*)

This, the southern portion of the county, has been settled about eighteen months. Already the people are trying to grow both fruit and forest trees. The present season has been very favorable for tree-growth. I have Cottonwood trees four feet high, grown from cuttings planted last spring. Catalpa and Russian Mulberry trees are making a fine growth. I have Catalpa and Russian Mulberry trees now a foot high, grown from seed planted in the spring on second sod. All kinds of fruit trees and vines are thriving, and strawberry plants are making an extra growth.

(*Report on Dec. 1, 1885.*)

The condition of forest-tree plantations was good at the opening of the last spring. The present year's planting far exceeded that of any preceding year, and was a success, as not to exceed five per cent. failed. Cottonwood, Catalpa (Western Hardy), Russian Mulberry and Black Walnut were principally used.

The varieties named in the Society's recommended list, so far as tried, have been successful. I would recommend planting on uplands as profitable, such varieties as are recommended in the list; and as there is very little lowland in the county, would not recommend for such localities any different varieties than for upland.

Of insects, there are none which are injurious to forest trees.

All forest-tree plantations must have thorough cultivation and careful attention while young.

The Russian Mulberry, so far as tried, is a fast grower, and promises to make a tree of good size, and is desirable. It thrives on all soils and locations where yet planted.

The conditions of climate and soil are more congenial to plant-growth, owing to an increased rainfall, than when the county was first settled, and there is no doubt in my mind of these Western prairies producing ample forest-tree growth to supply the settlers with the wood they need on a farm.

SEDGWICK COUNTY.—By William McCraken, Sunny Dale.

(*North half.*)

Forest-tree plantations in this portion of the county were in a good condition at the opening of spring in 1885. The planting of the present season was equal in extent to that in previous years, and was successful—not exceeding ten per cent. failing. White Maple, Catalpa, Cottonwood, Mulberry, Ash, Black Locust, and Ash-leaved Maple were most extensively used.

In place of the recommended list of the Society I offer the following, which is arranged in the order of comparative merit of each: 1. Wild Cherry, 2. Black Locust, 3. Catalpa (Western Hardy), 4. Sycamore, 5. Red Elm, 6. White Maple, 7. White Ash, 8. Black Walnut, 9. Russian Mulberry, 10. Red Cedar, 11. White Elm, 12. Ash-leaved Maple.

For uplands, the following are profitable: 1. Black Locust, 2. White Maple, 3. Ash-leaved Maple, 4. Peach, 5. Russian Mulberry, 6. Wild Cherry. For lowlands: 1. White Willow, 2. Catalpa, 3. Black Locust, 4. White Maple, 5. Sycamore, 6. Black Walnut.

Russian Mulberry: I have trees, six years old, which measure ten inches in circumference. They are very hardy, and easy to grow; are sure to bear fruit which is food for man, beasts and birds, and will last through a long season. For timber they should be planted very close together, and will grow on any soil. All forests should be planted closely, and cultivated two years. Afterwards they will take care of themselves.

I planted White Willow two feet apart in the row, and at six years old sold the rows at one dollar per rod. I have sold an acre of six-year-old Black Locust for one hundred dollars, and four years after it was cut down the sprouts were large enough for posts.

Insects: Only the Cottonwood is infested or troubled by such pests. Borers riddle the bodies, and worms destroy the leaves.

On account of the planting of trees, hedges, etc., the ground does not become so heated, and the atmosphere has become more moist during the dry seasons of the year than formerly. Hence the climate and soil have become more favorable to the production of a vegetable growth. There is not a section of our State, where there is soil, where the Black Locust, Catalpa and Russian Mulberry cannot be profitably grown, whether on the Western prairies or in other localities.

(*South half.—By J. G. Sampson, Derby.*)

The condition of forest-tree plantations was good in the spring of 1885, and the planting of the present season was successful, not to exceed 5 per cent. failing. Black Walnut, Ash, Ash-leaved Maple, Catalpa and Cottonwood were the leading varieties used.

I cannot offer any substitutes for the varieties named in the recommended list of the Society, which would be more desirable for this county. But some of them have serious faults, as I consider them, viz.: The Catalpa is a nurseryman's humbug; White Elm almost worthless when grown; Osage Orange is short-lived; Cottonwood is but little better than sunflowers. The Black Walnut, Ash and Ash-leaved Maple are the most valuable in the list.

I would not advise planting these on upland, as they thrive best on lowlands.

Russian Mulberry has been planted to as great an extent as tree peddlers could induce, but is not desirable.

Our climate and soil have become more favorable to the success of forest trees. The rainfalls have increased and occur with greater regularity, and hot winds have become less frequent.

I do not consider forest-tree culture would be profitable on our Western prairies, because lands which would prove adapted to such production would be more valuable for general farming purposes.

SUMNER COUNTY.—BY P. HOLLENBECK, BITTER CREEK.

(*South half.*)

Forest-tree plantations in this part of the county were in fair condition at the opening of spring in 1885. The planting of the present season was more extensive than that in previous years, and very successful, not to exceed five per cent. failing. The Cottonwood was most extensively used, and successfully grown.

All of the varieties named in the Society's recommended list are hardy here except the Maples, which are liable to sun-scald. This can be remedied by planting them with other varieties which will afford protection. Thorns on Osage Orange and Locust are faults considered objectionable. The Elms, especially the White, make poor fuel, and I consider it worthless, except for shade. The following list is offered, which is arranged in the order of comparative merit: For groves, use Cottonwood for a quick growth; White Maple for same character, but in shade of others; Black Walnut for timber and its nuts; Elms for beauty and shade; Catalpa for growth, variety, and posts; Osage Orange for fences and posts.

I would advise the selection of lowlands for forest trees, and for such would use Black Walnut, Catalpa, Cottonwood, White Maple, White Ash, Red Elm, and White Elm. When planted on upland they require thorough cultivation; and manuring would be a great advantage, giving a good start, and keeping the land loose and moist. Our uplands are generally of a thin soil, and lack moisture and plant-nutriment.

All forest trees need good culture until their growth will afford shade to the land, thereby keeping it moist and weeds subdued.

Insects: I am not aware of any being prevalent, and injurious to trees.

I think the climate and soil are more congenial to plant-growth than formerly. I believe the Western prairies will in time become productive of wood-growth in sufficient quantity to supply the needs of the farmers in those regions.

WILSON COUNTY.—By G. B. Brown, Guilford.

Forest trees artificially planted were in good condition at the commencement of last spring, and such as were planted the present season were a success. White Maple and Black Walnut were the kinds principally used, though all the varieties named in the Society's recommended list are successfully grown in this county. I would substitute the Pecan for White Maple. On upland I would recommend the planting of Peach trees especially for fuel; Osage Orange, Pecan and Black Walnut for fuel and other purposes.

Forest trees should have thorough cultivation while young, and when the land is poor it is highly beneficial to give it a top-dressing with manure.

Insects: None have been troublesome except the maple-worm, and these on the Maple trees only.

WOODSON COUNTY.—By M. C. Smith, Yates Center, and W. W. Smith, Leroy, (Coffey Co.)

The condition of artificial forests in the spring of 1885 was fair to good. The extent planted the present season was equal to that of previous years, and unusually successful. Red Elm, White Elm, White Maple, Black Walnut, Ash-leaved Maple, Cottonwood, White Ash, Catalpa, Locust and Ailantus were principally the varieties used.

The varieties named in the recommended list of the Society are all successfully grown in this county. The Cottonwood is short-lived and the Black Walnut a slow grower on uplands. The Ailantus is a hardy, easily propagated tree, enduring dry and hot weather, growing well on poor soil; is one of the most desirable for upland.

The following list is recommended for lowlands: Black Walnut, Honey Locust, Red Elm, White Ash, Catalpa, White Maple, and Cottonwood.

Russian Mulberry has been planted, and succeeds on any good land; is hardy and vigorous, and thrives on upland.

"During a residence of sixteen years in this county, I cannot observe that any change has occurred in climate or soil which has been more favorable to tree-growth."—(W. W. Smith.)

"From observation and experience, I believe that the Western prairies can be made to produce sufficient forest trees to meet the wants of settlers thereon."—(M. C. Smith.)

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